DLP PROJECTOR

SERVICE MANUAL

MODEL：PB6100 / PB6200

CAUTION

BEFORE SERVICING THE PROJECTOR,

READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



Index

1. Safety Precautions

INTRODUCTION

Warning

TO PREVENT SHOCK, DO NOT OPEN THE CABINET. NO USER –SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. PLEASE READ THIS USER'S GUIDE BEFORE YOU OPERATE YOUR PROJECTOR. SAVE THIS USER'S GUIDE FOR FUTURE REFERENCE

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Safety Instructions

1. Read this user's guide before you operate your projector and save it for futurereference.
2. The lamp becomes extremely hot during operation. Allow the projector to coolfor approximately 45 minutes prior to removing the lamp assembly forreplacement. Do not operate lamps beyond the rated lamp life. Excessiveoperation of lamps beyond the rated life could cause them to explode on rareoccasions.
3. Never replace the lamp assembly or any electronic components unless theprojector is unplugged.
4. To reduce the risk of electric shock, do not disassemble this appliance. Take it to aqualified technician when service or repair is required. Incorrect reassembly cancause electric shock when the appliance is subsequently used.
5. Do not place this product on an unstable cart, stand, or table. The product mayfall, sustaining serious damage.
6. This product is capable of displaying inverted images for ceiling mount installation.Please use suitable equipment for mounting the unit and ensure it is securelyinstalled.

Caution

- **Always remove the lens cap when the projector lamp is on.**
- **Do not look straight at the projector lens during operation. The intenselight beam may damage your eyes.**
- **In some countries, the line voltage is NOT stable. This projector isdesigned to operate safely within a bandwidth of 110 to 230 volts, butcould fail if power cuts or surges of more than10 volts occur. In thesehigh-risk areas, it is recommended that a power stabilizer unit be usedin conjuction with this projector.**

Save this user's guide: The information contained in this manual will assist you in operating and maintaining your personal projector.

2. Engineering Specification

Multimedia Projector
Preliminary Product Specifications

Model PB6100/PB6200
Revision 0.1, 2003/6/25

1.0 Optical Performance	Tested under 60" (diagonal) image size with Wide projection lens position, Toshiba T-1M meter and "SPOKE mode" unless otherwise specified. Measurement Details refer to Appendix A.	
1.1 ANSI Brightness	PB6200: 1360 Lumens PB6100: Minimum 1050 Lumens	
1.2 Brightness Uniformity	Minimum 50%	
1.3 Contrast Ratio		
1.3.1 ANSI Contrast	Minimum 150:1	
1.3.2 FOFO Contrast	Minimum 700:1	
1.4 Light Leakage		
1.4.1 Light Leakage in Active Area **(A22)**	PB6200: <1.5 lux within 60" (diagonal) image size PB6100: <1.5 lux within 47" (diagonal) image size	
1.4.2 Light Leakage out of Active Area	PB6200: <5 lux between of 60" (diagonal) image size and within 80" (diagonal) screen area PB6100: <5 lux between of 47" (diagonal) image size and within 60" (diagonal) screen area	
1.5 Color	Reference meter RD CL100-1 (TBD, determine after LP1)	
	X	y
1.5.1 White	.305±.040	.345±.040
1.5.2 Red	.635±.040	.367±.040
1.5.3 Green	.335±.040	.540±.040
1.5.4 Blue	.135±.040	.75±.040
2.0 Image Quality		
2.1 Throw Ratio	PB6200: 60"±5% Diagonal @ 2M (Wide) PB6100: 47"±5% Diagonal @ 2M (Wide)	
2.2 Zoom Ratio (tolerance applied)	1.22:1	
2.3 Distortion		
2.3.1 Keystone Distortion	<1.0%	

<table>
<tr><td>2.3.2 Vertical TV Distortion</td><td colspan="4"><1.0%</td></tr>
<tr><td>2.4 Projection Offset</td><td colspan="4">PB6200: 132% ±5%
PB6100: 155% ±5%</td></tr>
<tr><td>2.5 Focus Range</td><td colspan="4">1.5~6m</td></tr>
<tr><td>2.6 Focus (A20) (A23)</td><td colspan="2">Flare (B)
R <=4.5
G<=4.5
B<=4.5</td><td colspan="2">Defocus (A)
R<=2.0
G<=2.0
B<=2.0</td></tr>
<tr><td rowspan="4">2.7 Lateral Color (A21)</td><td></td><td colspan="2">Center of screen</td><td>All other area</td></tr>
<tr><td>R-G</td><td colspan="2"><1/2</td><td><1</td></tr>
<tr><td>G-B</td><td colspan="2"><1/2</td><td><1</td></tr>
<tr><td>R-B</td><td colspan="2"><2/3</td><td><1</td></tr>
<tr><td>2.8 DMD Image Quality</td><td colspan="4">See Appendix D</td></tr>
<tr><td>2.9.1 Dust in Active Area</td><td colspan="4">Follow TI's specification for Blemish in Appendix D</td></tr>
<tr><td>3.0 Mechanical Specification</td><td colspan="4"></td></tr>
<tr><td>3.1 Dimensions</td><td colspan="4">248 x 206 x 84 mm (L x W x H) (without protrusion part)
248 x 206 x 90 mm (L x W x H) (with protrusion part)</td></tr>
<tr><td>3.2 Weight</td><td colspan="4">2680g ± 100g (without lens cap)</td></tr>
<tr><td>3.3 Security Slot</td><td colspan="4">Kensington compatible slot 150N break away force</td></tr>
<tr><td>3.4 Lens Cover</td><td colspan="4">Detached Lens Cover</td></tr>
<tr><td>3.5 Feet</td><td colspan="4">Fast adjustable foot in front, Adjustable foot and Fixed foot in rear. foot Tilt:0-6° ,right/left: +2.2° /-0.5°</td></tr>
<tr><td>3.6 Handle</td><td colspan="4">NA</td></tr>
<tr><td>4.0 Packaging</td><td colspan="4">Detail refer to C309 (Packing Description)</td></tr>
<tr><td>4.1 Outside Dimensions</td><td colspan="4">460 x 455 x 292mm (L x W x H)</td></tr>
<tr><td>4.2 Weight</td><td colspan="4"><5.8 Kg (Including Accessories, Projector).</td></tr>
<tr><td>4.3 Palletization</td><td colspan="4">20 by Air; 728 / 40' container, or 336/20' container by sea</td></tr>
<tr><td>4.4 Drop</td><td colspan="4">Refer to Appendix B</td></tr>
<tr><td>4.5 Vibration</td><td colspan="4">Refer to Appendix B</td></tr>
</table>

4.6 Shock	50G, 20ms, Half-sine.	
5.0 Thermal Specification	Maximum temperature (0~40 Deg. C)	
5.1 Handles, knobs, grips, etc. and surface Held or touched for short periods only	Metal	Plastic
	60°C	85°C
(Bottom surface)	(55°C)	(70°C)
5.2 External surface or equipment which may be touched	Metal	Plastic
	70°C	95°C
5.3 Exhaust Air	80°C @ 25°C	
6.0 Environmental	Adhere to Appendix B	
6.1 Temperature	Operating	0~40°C, without condensation
	Storage	-10~60°C, without condensation
6.2 Humidity	Operating	15%~90%RH, without condensation
	Storage	10~90%RH, without condensation
6.3 Audible Noise Level (**Appendix C**)	Typical	Normal mode: 36dBA at @ 25°C Eco mode: 34dBA @ 25°C @Sea level
	Maximum	Normal mode: 37dBA at @ 25°C Eco mode: 35dBA @ 25°C @Sea level
6.4 Altitude	(1) Operating; 30°C, 4hrs 6000 feet, 20°C, 4hrs 10000 feet (2) on-operating: 30°C, 4 hrs 0-40000 feet	
6.5 Temperature cycle test (Follow CNS：68-2,12919)	Operating test	0~40°C, Humidity：10%~90%
	Non-operating test	-10~60°C, Humidity：10%~90%
7.0 Regulatory	Safety	CB, US, TUV-GS, CCC, PSB, GOST, B-Mark
	EMC	FCC Class-B, CE Class-B, BSMI, MIC, C-Tick
	CE Marks	Directive 73/23/EEC;

		Directive 89/336/EEC;
	ESD	BENQ ESD Specification
	Laser	FDA, PSC
8.0 Reliability		
8.1 General Failure Def.	Adhere to Appendix B	
8.2 MTBF	20000 hours except DMD chip, Color wheel, Lamp and Fan	
8.3 Lamp Lifetime	2000 hours (50% brightness maintenance with survival ratio more than 50%)	
9.0 Power Requirements		
9.1 Input Voltage Range	90 V ac to 264 V ac	
9.2 Frequency Range	47 Hz to 63 Hz.	
9.3 Inrush Current (Cold start only)	220V	Below 46A
	240V	Below 50A
9.4 Power consumption	285W MAX	
9.5 Standby Power consumption	Below 15W	
9.6 HI–POT	1500Vac or 2121 V dc for 1 second	
9.7 Leakage Current	0.75mA at 100 V	
9.8 EMI	FCC part 15 Class B	
	CISPR22 1997 Class B	
9.9 Electro Static Discharge (ESD)	CE standard	+\-4 KV contact,+\-8KV air discharge 330Ω 150pf
9.10 Electrical Fast Transients (EFT)	+\-1KV on input power lines.	
9.11 Surge	+\-1KV line to line, +\-2KV line to ground on input power lines.	

9.12 Voltage Dips	Standard	EN61000-4-11
9.13 Power Connector	IEC	
9.14 Other	Refer to appendix F	
10.0 Panel Specification		
10.1 Type	PB6200: Single Chip 0.7" XGA 12° tilt DDR DMD PB6100: Single Chip 0.55" SVGA 12° tilt DDR DMD	
10.2 Pixels	PB6200: H: 1024 X V: 768 PB6100: H: 800 X V: 600	
10.3 Color Depth	24 Bits (16770000 colors)	
11.0 Compatibility	System firm ware is provided by Customer	
11.1 PC	PC Compatible 640X480 → 1024X768, compressed 1280X1024; Composite-Sync; Sync-on-Green; Interlace Mode (8514A);	
11.2 Video	NTSC/ NTSC4.43/ PAL (Including PAL-M, PAL-N)/ SECAM/ PAL60/	
11.3 YpbPr	NTSC (480i)/ 480p/ PAL (576i)/ 576p, HDTV (720p/ 1080i)	
11.4 DDC	DDC 2B	
12.0 Image Interface	Adhere to Appendix E.2	
12.1 Analog RGB Input	15 pin D-Sub (Female) x 1 G(Y): Video amplitude 0.7/1.0 Vp-p : Impedance 75 RB(CbCr): Video amplitude 0.7 Vp-p : Impedance 75 HD/VD/CS: TTL Level	
12.2 Video Input	RCA jack (Yellow) Video amplitude 1.0 V_{p-p} : Impedance 75Ω	
12.3 S-Video Input	4 pin Mini-Din (Female) Y: Luminance amplitude 1.0 V_{p-p} : Impedance 75Ω C: Chroma amplitude 0.268 V_{p-p} : Impedance 75Ω	
13.0 Control Interface		
13.1 IR Receiver	IR Receiver x2 (Front, Rear)	

14.0 User Interface	Adhere to Appendix E.3
14.1 Operator Keypad	9 Keys: On/Standby; Auto Keystone; Input; Auto Set; Menu; Left/(Vol+); Right/(Vol-); Up; Down
14.2 Indicators	4 LEDs: Power On/Off Status; Lamp Status; Temperature Status; Fan Status

Appendix A Optical Measurement

1. Scope:

This document describes critical optical related test definitions and Instructions for data or video projectors. The other general terminologies are specified in ANSI IT7.228-1997.

2. General Requirements

1. The unit under test should be allowed to stabilize without further adjustment for a minimum of 5 minutes, at nominal ambient room temperature of 25°C, before making measurements.
2. Measurements shall take place in a light proof room, where the only source of illumination is the projector. Less than 1 lux of the light on the screen shall be from any source other than the projector.
3. All measurements shall be made on flat screens that do not provide any advantage to the performance of the unit
4. All measurements shall be made at standard color temperature setting, 100% white image (per ANSI IT7.228-1997), except where noted

3. Practical Requirements

1. When measuring contrast manually, operators should not wear white clothing since light reflected from white clothing can influence the measurement.
2. Unless otherwise specified, the projection lens is set in the widest zoom position since zoom function can influence the measurement.
3. Measurement should be performed with Minolta Chromameter, Model CL-100, or equivalent.

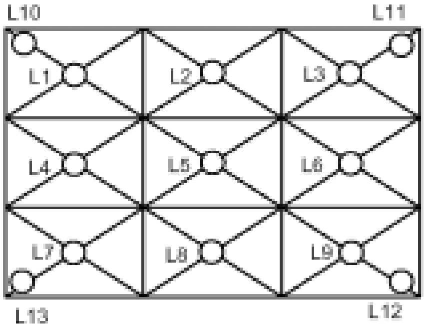
A1. ANSI BRIGHTNESS

ANSI Lumens = (L1+L2+L3+L4+L5+L6+L7+L8+L9)/9 (lux) x A (m^2)

A (Area) = W * H (m^2)

W: width of projected image (m)

H: height of projected image (m)



Note: L10, L11, L12, L13 are located at 10% of the distance from corner itself to L5

A2. BRIGHTNESS UNIFORMITY

Brightness Uniformity = Minimum (L10,L11,L12,L13)/ Average (L1,L2,L3,L4,L5,L6,L7,L8,L9)

A3. JBMA UNIFORMITY

JBMA Uniformity = Average (L1, L3, L7, L9)/ L5

A4. ANSI CONTRAST

ANSI Contrast = Average lux value of the white rectangles/Average lux value of the black rectangles

Contrast Ratio shall be determined from illuminance values obtained from a black-and-white "chessboard" pattern consisting of 16 equal rectangles. The white rectangles shall be at 100% gray and the black rectangles at 0% gray. Illuminance measurements shall be made at the center of each of the rectangles.

A5. FOFO CONTRAST

FOFO Contrast = Lux value at the center of a solid white screen/the lux value at the

center of a solid black screen

A6. JBMA CONTRAST

JBMA Contrast = Average (L1,L2,L3,L4,L5,L6,L7,L8,L9) under solid white / Average (L1,L2,L3,L4,L5,L6,L7,L8,L9) under solid black

A7. LIGHT LEAKAGE

Leakage = The maximum light leakage under a solid black pattern in or outside of the projected image

A8. IMAGE DISTORTION

Keystone = (W2-W1)/ (W1+W2) x 100%

Vertical TV dist = (H1+H2-2xH3)/2H2 x100%

Horizontal TV dist = (W1+W2-2xW3)/2W1 x100%

W1: image width at image bottom

W2: image width at image top

W3: image width at the half image height.

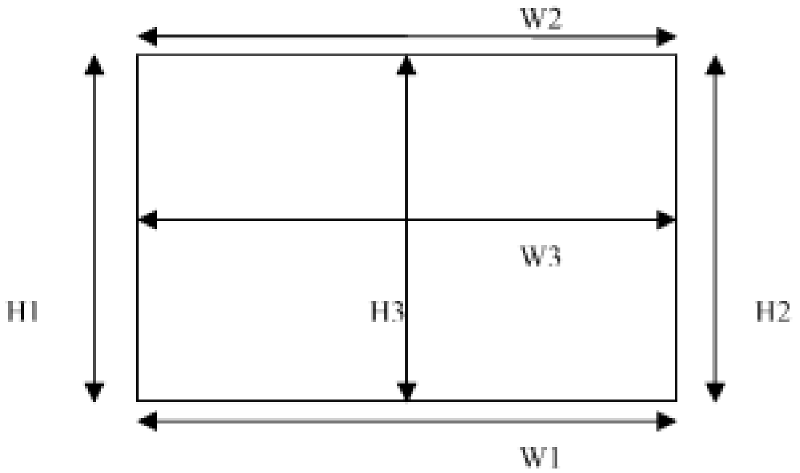
H1: image height at image left

H2: image height at image right

H3: image height at half image

Note:

1. Keystone and Vertical TV Distortion are recommended for Front Projection Display
2. Vertical and Horizontal TV Distortion are recommended for Rear Projection Display



A9. THROW RATIO

Throw ratio = projection distance / the width of the projected image

A10. ZOOM RATIO

Zoom ratio = maximum / minimum image diagonal size at a fixed projection distance

A11. FOCUS RANGE

The minimum/maximum focus distance is the minimum/maximum projection distance (The distance between the outermost element of projection lens and screen), expressed in meter, at which the image is still at its acceptable focus level.(acceptable focus level is specified by FOCUS LIMIT SAMPLE approved by customer)

A13. COLOR

Color is expressed as (x, y) in 1931CIE chromaticity values
Note: Color is measured at the center of the screen that is entirely the measured color under default brightness and contrast settings.

A14. ANSI COLOR

ANSI Color is expressed as (u, v) in 1976 CIE chromaticity values
Note: Color is measured at the center of the screen that is entirely the measured color

under default brightness and contrast settings.

A15. COLOR UNIFORMITY

Color Uniformity is the maximum color difference (△x, △y) between any two points out of L1~L13

A16. ANSI COLOR UNIFORMITY

ANSI Color Uniformity: △u'v'= [(u'1-u'0)^2+(v'1-v'0)^2]^1/2

(u'0,v'0): the average color of L1~L13

(u'1,v'1): the spot with maximum deviation from (u'0,v'0)

A17. PROJECTION OFFSET

Projection Offset= Center of image above projection lens optical axis / Half image height x 100%

Note: Optical engine should be kept horizontal attitude

A18. Customer defined Brightness Uniformity

Customer defined Brightness Uniformity

= Average (L10,L11,L12,L13)/ Max(L1,L2,L3,L4,L5,L6,L7,L8,L9)

A19. Customer Defined COLOR UNIFORMITY

Customer Defined Color Uniformity: duv= $[(u_1-u_0)^2+(v_1-v_0)^2]^{1/2}$

(u_0,v_0) and (u_1,v_1) are the two points out of L1,L2,L3,L4,L5,L6,L7,L8,L9,L10,L11,L12,L13 which have maximum distance in CIE1960 color space

A20. Focus

i. Focus test procedure (Wide only)

a. Pattern: Cross Hatch (Refer to A27 for all related test patterns)

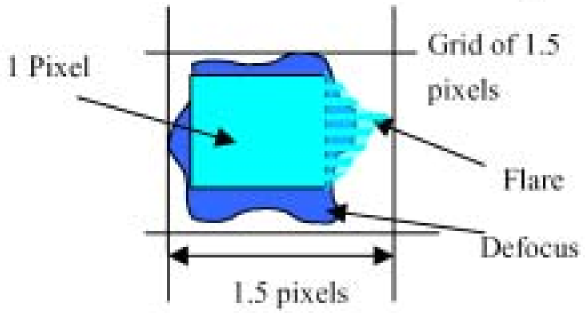
b. Steps:

Step 1: Get best focus at Screen Center with "Phon Pattern"

Step 2: Check "Cross Hatch" at 60", Wide position.

Step 3: Observe R, G, B color separately and check "Center and 4 corners of screen" for "Defocus" and "Flare" (Check line only, no check point)

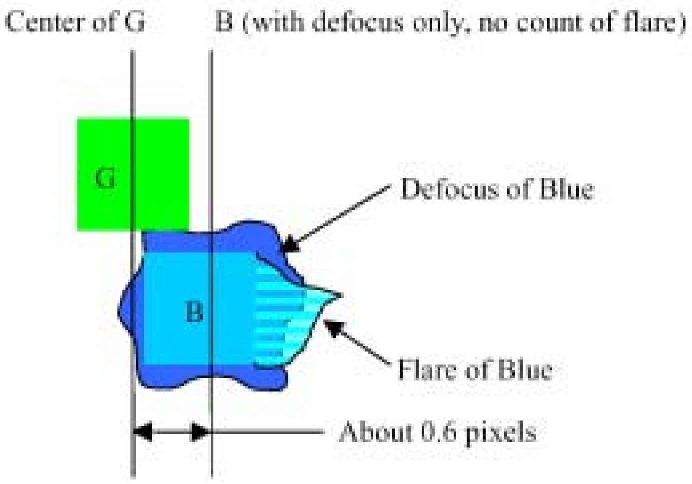
ii. Criteria: Measure the flare size with agreed "Grid" paper and as follows:



A21. Lateral Color

i. Lateral Color test procedure (Wide only)
   a. Pattern: BenQ Lateral color pattern (Refer to A27 for all related test patterns)
   b. Steps:
      Step 1: Adjust focus as described in A20 Step 1
      Step 2: Check Lateral Color at 60", Wide position
      Step 3: Measure the lateral color for whole screen

ii. Criteria:
   a. G to R < E pixel
   b. G to B < F pixels
   c. R to B can be < G pixels
   d. Measure the Lateral Color with following condition:



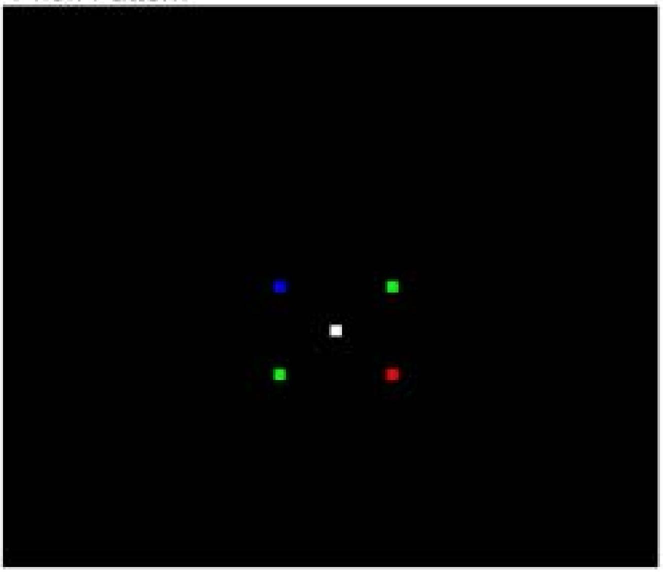
A22. Light Leakage

Light leakage in Active Area= Brightness of Brightest spot of light leakage – L5

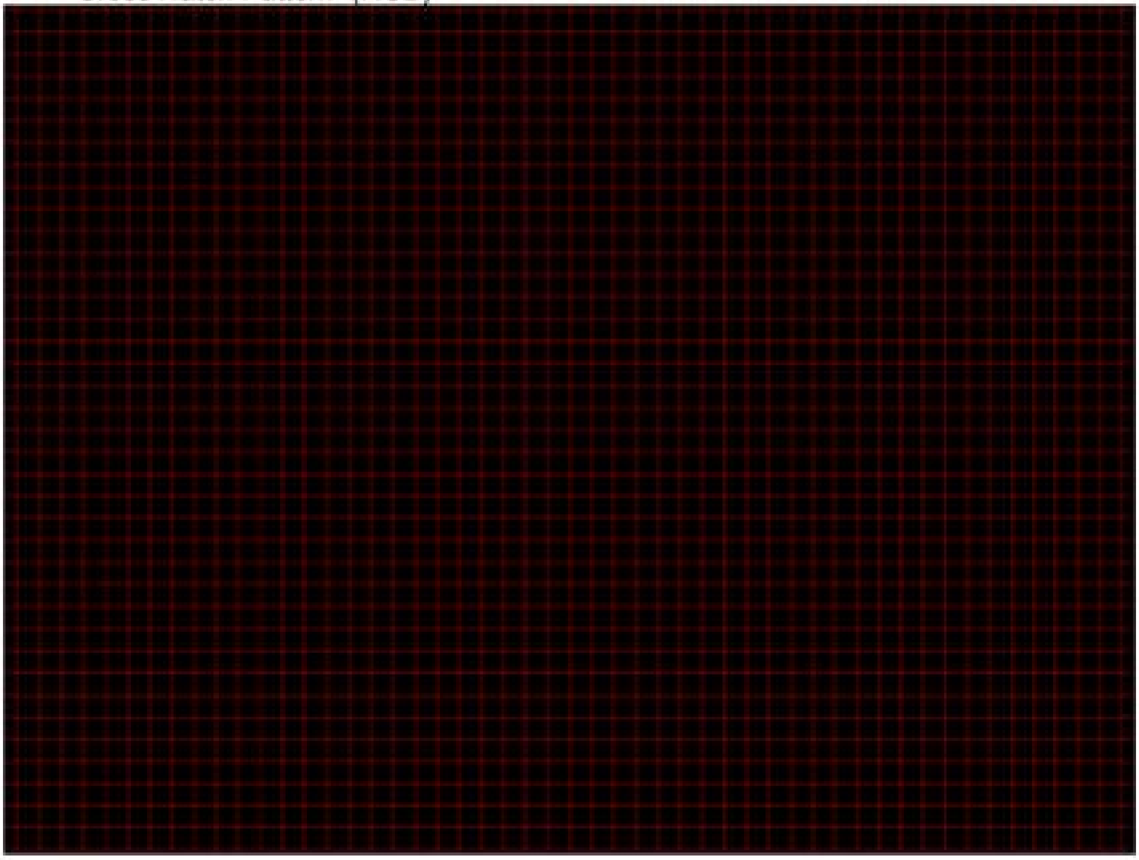
A23. Focus Test Patterns

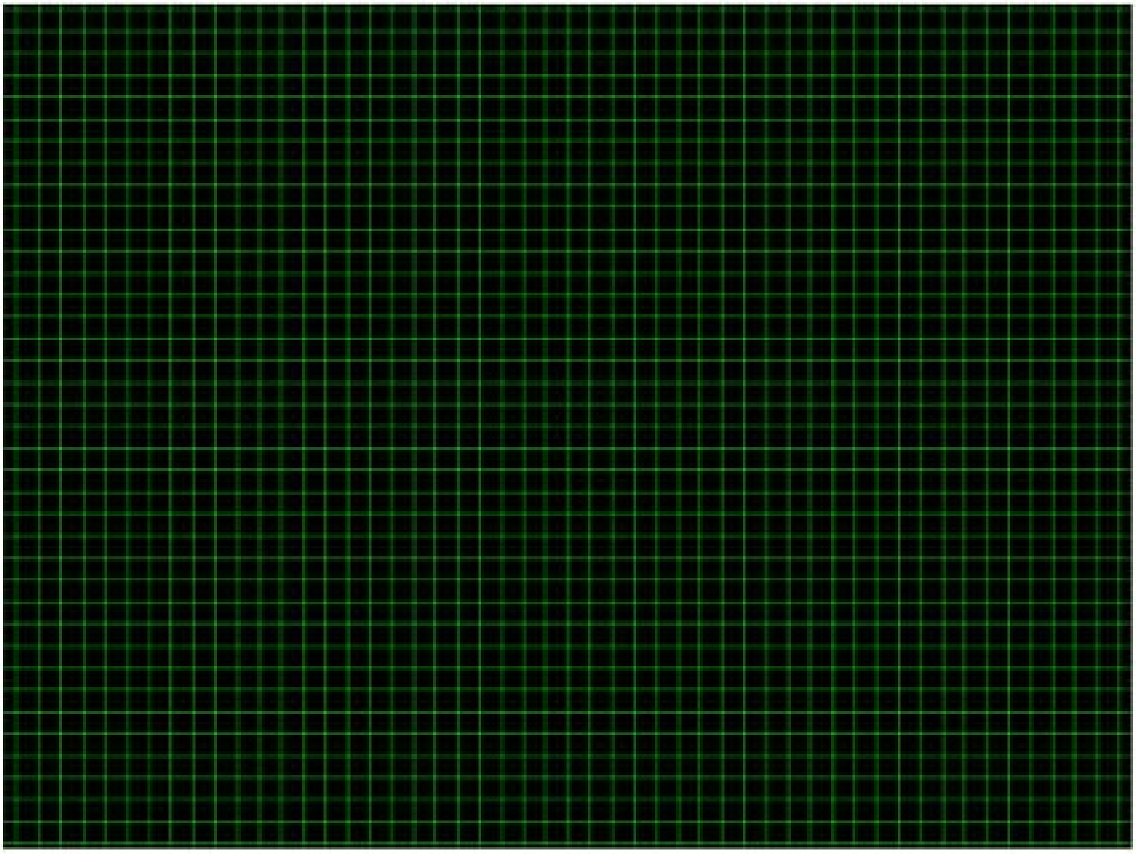
All patterns used in qualify the focus quality. Pattern list here for reference only and patterns with correct resolution shall be used in qualification.

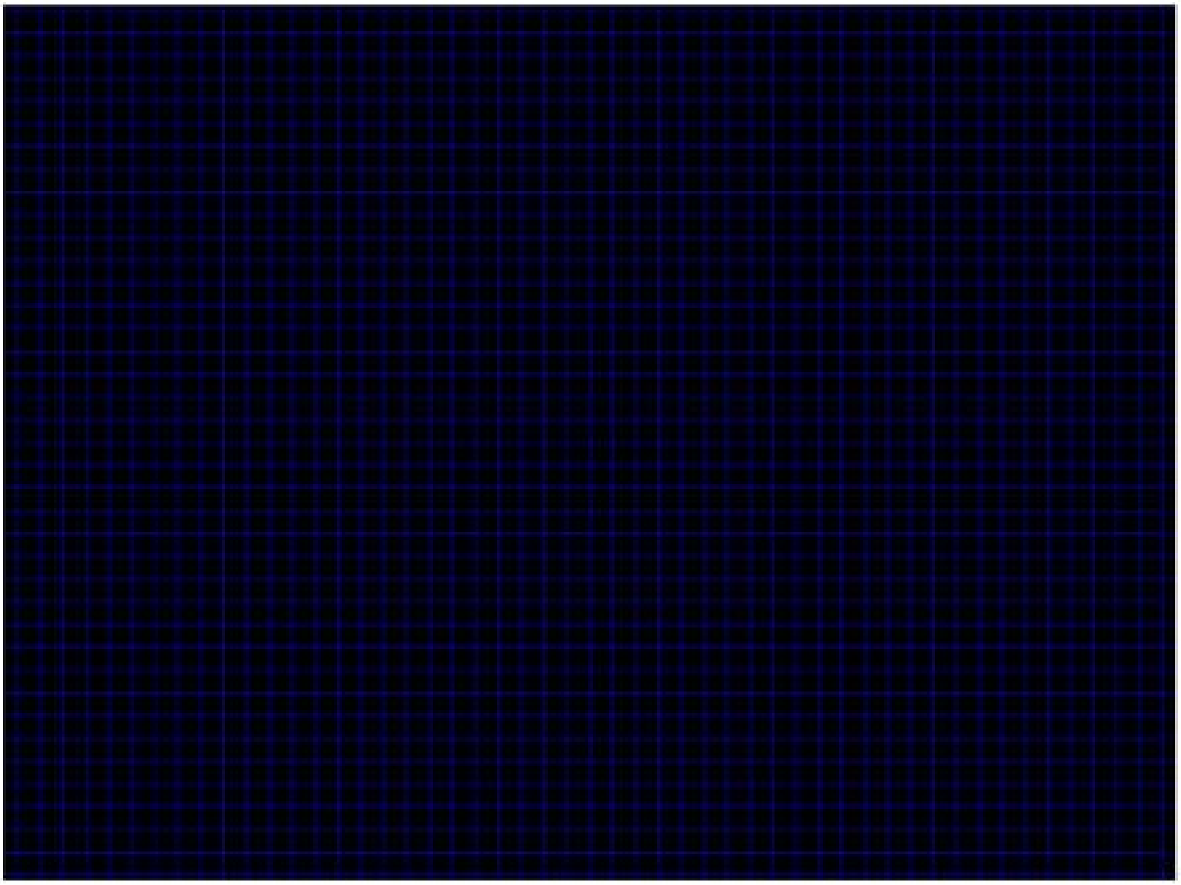
"Phon Pattern"



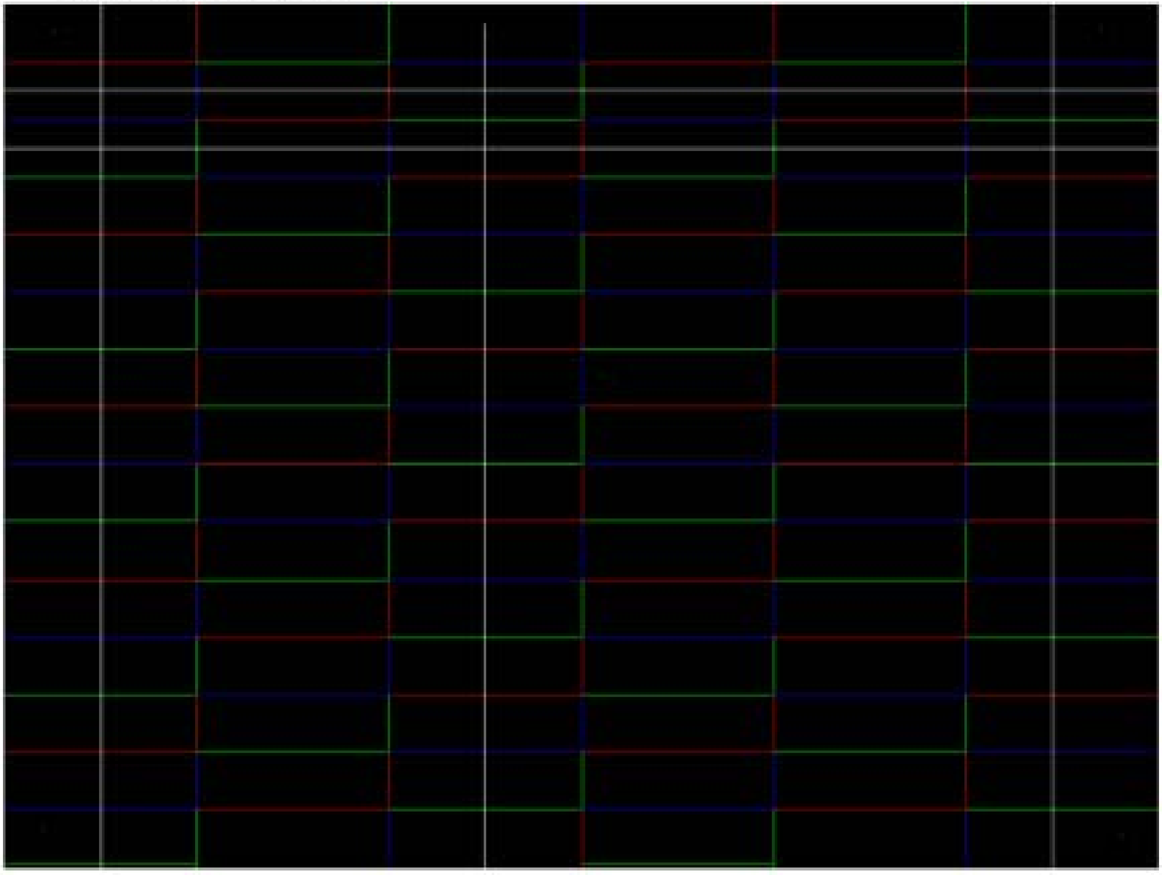
"Cross Hatch Pattern" (RGB)







"Lateral Color Pattern"



Appendix B Design Verification Test Procedure

1. Purpose

This standard establishes the environmental specification for projector related products, which defines the level of product performance and reliability in the field. It is not necessary the intent of these specification to simulate a typical user environment, but rather to provide for a level of product robustness that when applied over a wide range of manufacturing variability and environmental usage conditions, which is recommended for product assurance testing reference.

2. Test Summary

Dynamic Testing	Specification
Package Drop Please refer to another attached file.	76cm, 1 drop per orientation, all 6 primary surfaces, plus a minimum of two selected corners, and three selected edges, total of 11 drops Sample: 2 units.
Package Vibration Please refer to another attached file.	***Random***, 0.01g2/Hz, 5~100Hz, all primary axis, 20 min per orientation, total of 60 min. ***Sine***, 0.5g, 5~200Hz, 1 octave/min, 15 min dwell on each resonant frequency, all primary axis, one sweep (30 min minimum) per orientation, total of 90+ min. **Procedure:** 1. Samples are checked O.K by appearance and E.E function, then record optical data (brightness, uniformity and contrast ratio before test 2. Perform random vibration after sine-wave vibration test

	3. Sample: 2 units.
Bench Drop	***Pivot***, 90 degree, sitting on right and left side, 1 drop per orientation, total of 2 drops ***Flat***, 50mm, wooden table, bottom and opposite, 1 drop per orientation, total of 2 drops Sample: 2 units.
Security Lock	150N break away force

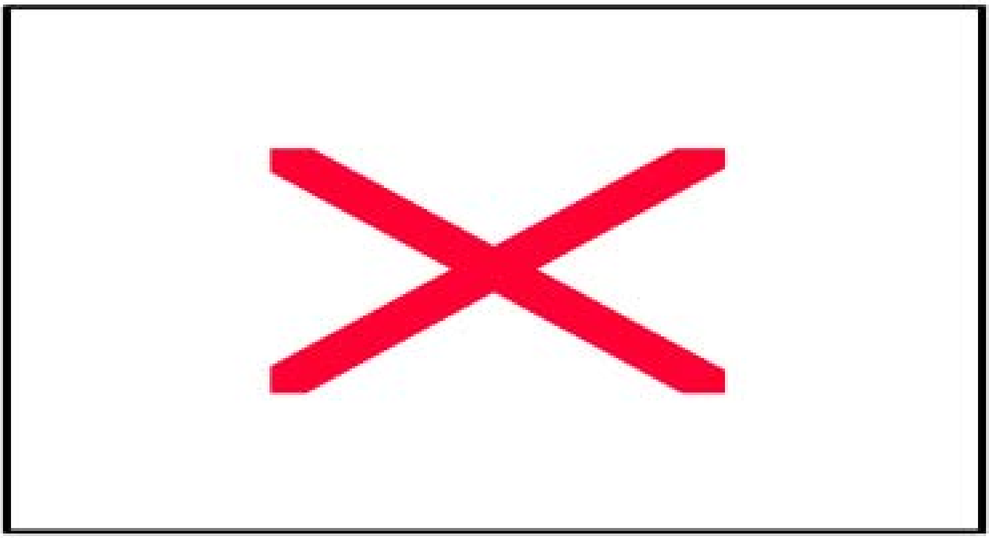
3. Failure Criteria

The product is expected to perform to its full potential without loss of function, performance, critical parametric changes, and other undesirable anomalies, over the applied boundaries of this specification. The following product failure is not allowed within the boundaries defined in this specification:

1. Failure including permanent damage, critical paramedics changes (optical performance defined in Appendix A), and latent defects.
2. Failure requiring operator intervention.
3. Failure violating external laws, regulatory agency standards, and government directives.
4. Failure resulting in a safety, potential safety, issue.

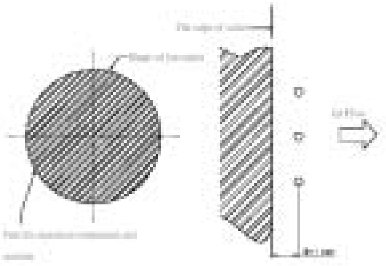
Appendix C Thermal and Noise Test Procedure

Ⅰ、**Noise Testing Standard** **Based on *B Shown as follows,**



Ⅱ、**Exhaust Air：**

The maximum temperature of outlet is metal 95℃ and measurement position shown as follows,



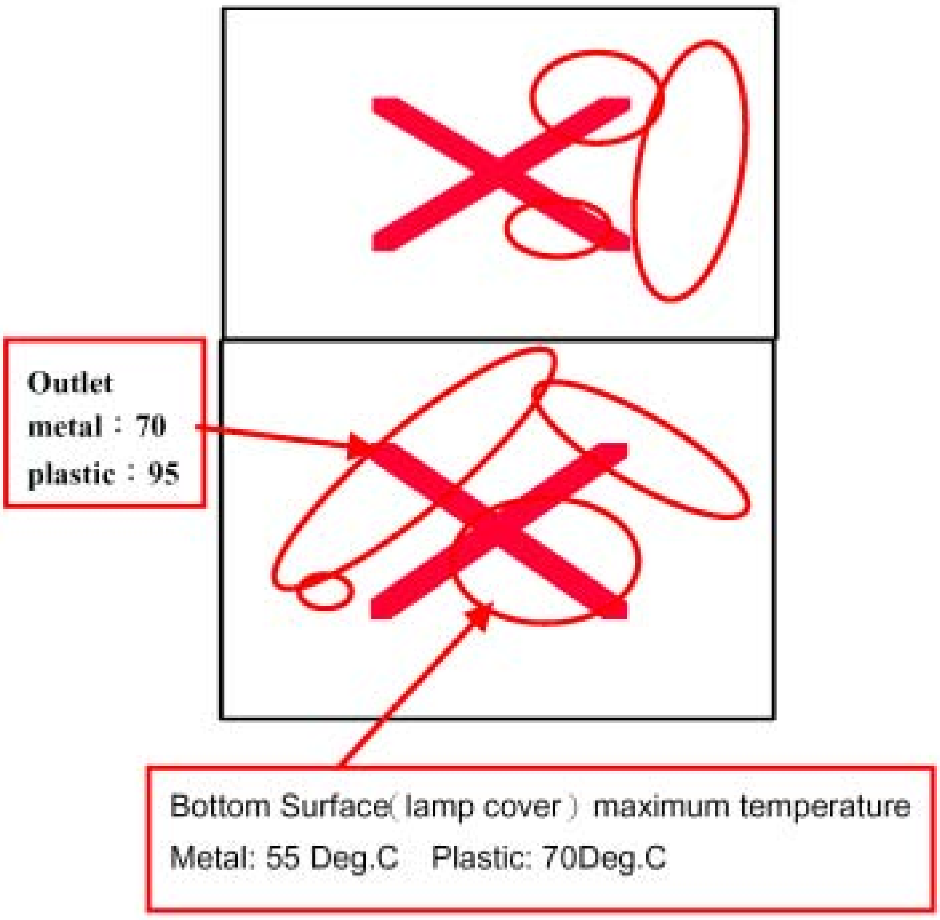
Position of measurement

Ⅲ、Temperature of System Level：

Before measurement temperature, we can use IR camera to make sure the position

of hot spot. We defined maximum temperature and measurement position as following：

Area	Define	Spec. Maximum	
		metal℃	plastic℃
Maybe touch	All surface	70	95
Touch for short period only	Key pad, Adjustment foot/lens, side surface	60	85
Bottom	Lamp cover	55	70
Outlet	Mesh surface	70	95



Appendix D DMD Image Quality

This document is an excerpt from TI's document 2501907

1. SCOPE

   This document specifies the image quality requirements applicable to the DLP™ XGA Component Set. The Component Set provides the DLP™ XGA Projector (herein referred to as the Projector), with digital imaging functionality based on Digital Micromirror Device (DMD) technology.. Other requirements for the Kit are specified in TI Drawing 4144756.

2. Definitions

   2.1 Blemish

   A blemish is an obstruction, reflection, or refraction of light that is visible, but out of focus in the projected image under specified conditions of inspection (see Table 1). It is caused by a particle, scratch, or other artifact located in the image illumination path.

   2.2 Dark pixel

   A single pixel or mirror that is stuck in the OFF position and is visibly darker than the surrounding pixels.

   2.3 Bright pixel

   A single pixel or mirror that is stuck in the ON position and is visibly brighter than the surrounding pixels.

   2.4 Unstable pixel

   A single pixel or mirror that does not operate in sequence with parameters loaded into memory. The unstable pixel appears to be flickering asynchronously with the image.

   2.5 Adjacent pixel

   Two or more stuck pixels sharing a common border or common point, also referred to as a cluster.

   2.6 Streaks

   Artifact resulting from localized variation in mirror tilt angle relative to surrounding mirrors. They are similar in appearance to window scratches but appear at the mirror level. Streaks appear as faint diagonal or arcing patterns in the image.

2.7 Sea of Mirrors (SOM)

SOM is a rectangular array of off-state mirrors surrounding the active area.

2.8 Eyecatcher

A small localized light "spot" which has high spatial frequency and high differential brightness. These are due to various DMD window or window aperture "defects" including: digs, voids, particles and scratches.

2.9 Border Artifacts

All variations of these artifacts are acceptable under this image quality specification. Border artifacts are a general category of image artifacts that may show up on screen in the area outside of the active array. Border artifacts include: Exposed Bond Wires, Exposed Metal 2, and Reflective Edge.

2.9.1 Bond Wires

Bond Wires attach the die to the superstructure. If visible, they will appear as short light parallel lines outside of the Sea of Mirrors (SOM).

2.9.2 Exposed Metal 2

Exposed Metal 2 is due to a shift in positioning of either the die or the window aperture, which may allow light to be reflected off of the layer of metal 2 that is below the super structure (mirrors). This defect is located at the outer edge of the SOM.

2.9.3 Reflective Edge

Reflective Edge is light that may reflect from the edge of the DMD's window aperture onto the projection screen. It will appear as a thin diffuse line outside of the SOM.

2.10 Two Zone Blue 60 Screen

The Two Zone Blue 60 screen is used to test for major dark blemishes. Refer to Figure 1 for configuration. All areas of the screen are colored a Microsoft Paintbrush blue 60 (green and red set at 0, blue set at 60).

NOTE: If linear degamma is not used then the Microsoft Paintbrush values must be adjusted to match the degamma table being used in order to generate an equivalent blue level on the test screen image.

2.11 Two Zone Gray 10 Screen

The Two Zone Gray 10 screen is used to test for major light blemishes. Refer to Figure 1 for configuration. All areas of the screen are colored a Microsoft Paintbrush gray 10 (green, red, and blue set at 10).

NOTE: If linear degamma is not used then the Microsoft Paintbrush values must be adjusted to match the degamma table being used in order to generate an equivalent gray level on the test screen image.

The Kit shall provide digital imaging functionality, in accordance with the Projector system design allocations, such that it provides the Projector with the functional capability to project images that meet the image quality requirements specified in Table I and it shall not possess artifacts or other characteristics that cause projected images to fail to meet those same requirements.

3. ACCEPTANCE REQUIREMENTS

3.11 Conditions of Acceptance

All DMD image quality defects must be determined under the following projected image test conditions:

a. Projector degamma shall be linear.
b. Projector error diffusion shall be "off."
c. Projector brightness and contrast settings shall be set to nominal.
d. The diagonal size of the projected image shall be a minimum of 60 inches.
e. The projection screen shall be 1X gain.
f. The projected image shall be inspected from an 8 feet minimum viewing distance.
g. The image shall be in focus during all Table 1 tests.
h. Operator Vision

Verification that projected images meet the specified acceptance criteria shall be performed by operators that:

a. Have 20/20 or better natural or corrected vision as determined by Snellen chart or equivalent eye tests.
b. Are capable of distinguishing colors as determined by Ishihara or equivalent

color blindness eye test.

3.2 Test Sequence

Tests shall be run in the sequence listed in Table 1.

TABLE 1. Image Quality Specification

SEQ #	TEST	SCREEN	ACCEPTANCE CRITERIA
1	Major Dark Blemish	Two Zone Blue 60	1. No blemish will be darker than Microsoft Blue 60 in the Critical Zone 2. ≤ 2 blemishes in the Non-Critical Zone 3. No blemish will be > ½" long/diameter
2	Major Light Blemish	Two Zone Gray 10	1. No blemish will be lighter than Microsoft Gray 10 in the Critical Zone 2. ≤ 2 blemishes in the Non Critical Zone 3. No blemish will be > ½" long/diameter
3	Eyecatcher	Gray 10	1. No eyecatcher will be lighter than Microsoft Gray 10
	Streaks	Blue 60 Gray 10 White	1. No streaks
	Projected Images	Any screen	1. No adjacent pixels 2. No bright pixels (Active Area) 3. ≤ 1 bright pixel (SOM) 4. ≤ 4 dark pixels 5. ≤ 6 minor blemishes 6. No DMD window aperture shadowing on the Active Area 7. No unstable pixels in Active Area

Notes:

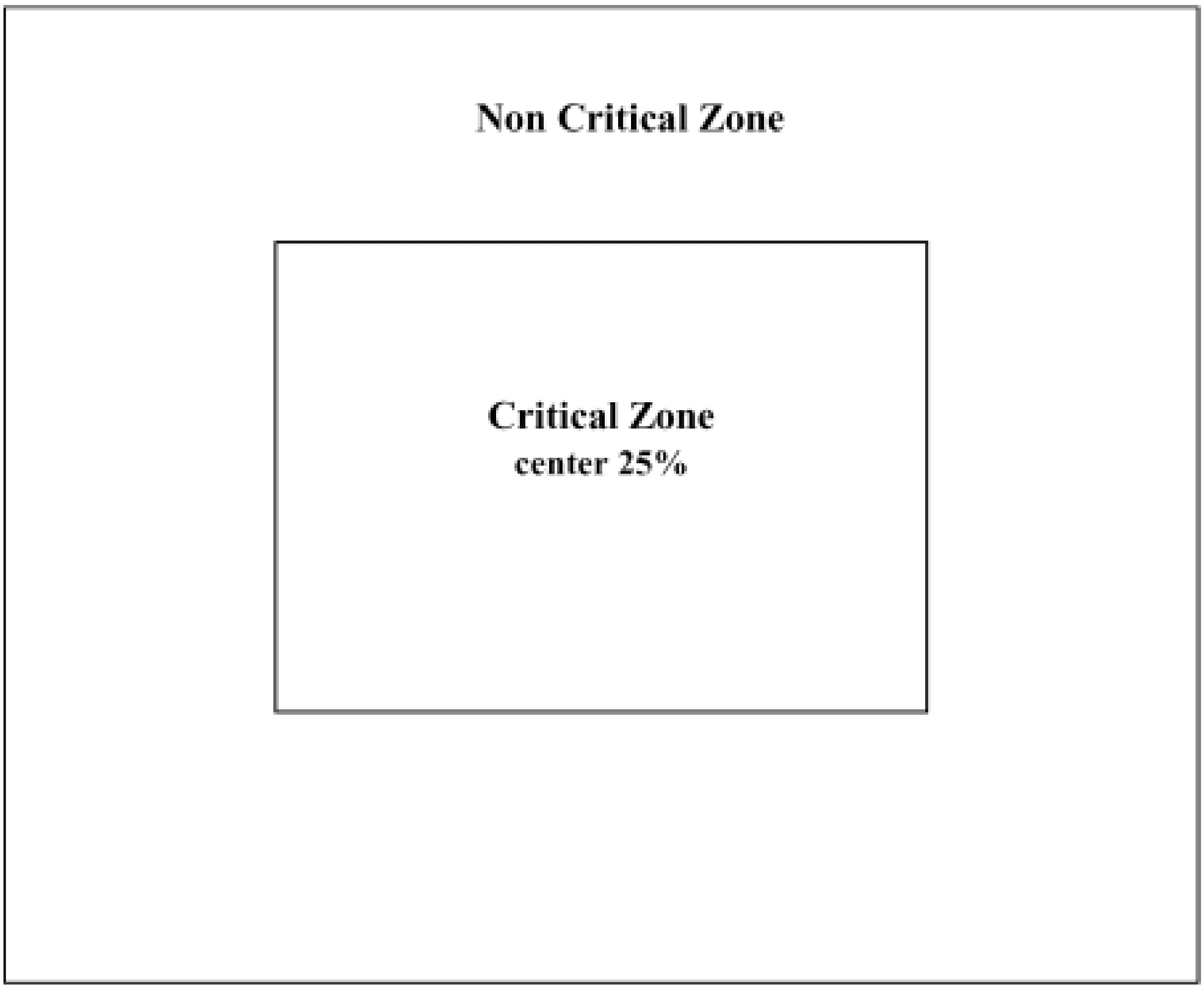
Tests shall be performed in the sequence indicated in Table I.

1. Projected blemish numbers include the count for the shadow of the artifact in addition to the artifact itself, so that the count usually represents a single artifact on the window.
2. No blemish shall be more than 5 inches long or have a total area of more than 5 square

inches on a 60-inch diagonal projected image. (≤ ½ inch for Major Blemish tests)

3. During all Table 1 tests, projected images shall be inspected in accordance with the conditions of inspection specified in Section 3.
4. The rejection basis for all cosmetic DMD defects (scratches, nicks, particles) will be the projected image tests referenced in Table 1.
5. Any other image quality issue not specifically defined in this document shall be acceptable.
6. Black screens shall not be used as a basis for rejecting DMDs for image quality.

Figure 1. Major Blemish Two Zone Screen



Appendix E Electrical Specification

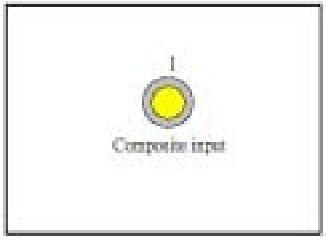
E1 Interface Definition

- 15 pin definition of the mini D-sub male for DDC2B protocol



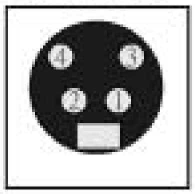
Pin	Definition	Pin	Definition	Pin	Definition	Pin	Definition
1	Red Signal	2	Green Signal	3	Blue Signal	4	PC_RXD
	Color Difference Signal (Pr)		Luminance Signal (Y)		Color Difference Signal (Pr)		
5	PC_TXD	6	GND (R)	7	GND (G)	8	GND (B)
			GND (Pr)		GND (Y)		GND (Pb)
9	NC	10	GND	11	GND	12	SDA
13	Horizontal Sync	14	Vertical Sync	15	SCL		

- Video & Component Input



Pin	Definition
1	Composite video

- S-Video input



Pin	Description
1	GND
2	GND
3	Luminance

4	Chroma

E2 Characteristics of inputs/outputs

Signal	Parameter	Min	Type	Max	
RDATA GDATA BDATA	Impedance		75		Ohm
	Amplitude		0.7		Volts peak-to-peak
	Black pedestal		0		Volts
	Pixel Clock		140		M Hz
GDATA_SOG	Impedance		75		Ohm
	Amplitude		1		Volts peak-to-peak
	Video amplitude		0.7		Volts peak-to-peak
	Sync amplitude		0.3		Volts peak-to-peak
	Black pedestal		0		Volts
	Pixel Clock		140		M Hz
HDATA	Impedance		1		K ohm
	Amplitude, low level	0		0.8	volt
	Amplitude, high level	2.5		5	Volt
	Frequency	24		100	K Hz
VDATA	Impedance		1		K ohm
	Amplitude, low level	0		0.8	volt
	Amplitude, high level	2.5		5	Volt
	Frequency	48		120	Hz
SDADATA	Amplitude, low level	0		0.8	volt
	Amplitude, high level	2.5		5	Volt
SCLDATA	Amplitude, low level	0		0.8	volt
	Amplitude, high level	2.5		5	Volt
PC_RXD	Amplitude, low level	0		0.8	Volt
	Amplitude, high level	2.0		5	Volt
PC_TXD	Amplitude, low leve	0		0.55	
	Amplitude, high level	2.2		3.3	Volt

CVBS Luminance	Amplitude, total (video+ sync)		1		Volts peak to peak
	Amplitude, video		0.7		Volts peak to peak
	Amplitude, sync		0.3		Volts peak to peak
	Impedance		75		ohm
CVBS Chroma	Amplitude		300		m Volts peak to peak
	Impedance		75		ohm

E3 Timing Table

The Established timing is as following:

Resolution	Mode	Refresh rate (Hz)	H-frequency (kHz)	Clock (MHz)
720 x 400	720x400_85	85.039	37.927	35.500
640 x 480	VGA_60	59.940	31.469	25.175
	VGA_72	72.809	37.861	31.500
	VGA_75	75.000	37.500	31.500
	VGA_85	85.008	43.269	36.000
800 x 600	SVGA_56	56.250	35.156	36.000
	SVGA_60	60.317	37.879	40.000
	SVGA_72	72.188	48.077	50.000
	SVGA_75	75.000	46.875	49.500
	SVGA_85	85.061	53.674	56.250
832 x 624	MAC16"	74.550	49.725	57.283
1024 x 768	XGA_43i	86.957	35.522	44.900
	XGA_60	60.004	48.363	65.000
	XGA_70	70.069	56.476	75.000
	XGA_75	75.029	60.023	78.750
	XGA_85	84.997	68.667	94.500
	MAC19"	74.700	60.134	79.857
1152 x 864	SXGA1_75	75.000	67.500	108.000
1280 x 960	QuadVGA_60	60.000	60.000	108.000
1280 x 1024	SXGA3_60	60.020	63.981	108.000
	SXGA3_75	75.025	79.976	135.000

Appendix F   Power Supply Specification

F.1 Protection

1. Over Voltage

   The power will be automatically self-limited while any single component failure and output voltage will be tripped and protected.

2. Over Current

   Output current will be limited

3. Short Circuit

   The power is protected that a short happened between the output terminals and there are not the risks of electric shocks.

3. Spare Parts List

Model : PB6100

Item	Component	Description	Type
1	42.J8618.001	U/C PC+ABS PB6100	R
2	55.J7612.001	PCBA KEYPAD BD PB7200 BENQ850	2
3	54.J8612.001	BALLAST PHG201G16 PB6100	R
4	60.J8605.001	ASSY Lower Case PB6100	R
5	23.10102.001	BLOWER 12V 50*50*20MM ADDA	R
6	60.J8617.001	ASSY LAMPBOX PB6100	R
7	23.10103.001	FAN 12V 70*70*25AXIAL ADDA	R
8	60.J8604.001	ASSY R/C PB6100	R
9	55.J8608.001	PCBA REAR IR BD PB6100	2
10	65.J8602.001	ASSY AC INLET+THERM SW PB6100	R
11	55.J5019.001	PCBA THERMAL BD DX850	2
12	55.J5020.001	PCBA EMI BD DX850	2
13	55.J8601.001	PCBA MAIN BD PB6100	2
14	60.J8607.001	ASSY DOOR PB6100	R
15	55.J1313.001	PCB 1L SENSOR-B BD SL700 X MI	2
16	65.J8603.001	CW DIA44DEG110 PB6100 PRODISC	R
17	55.J5019.001	PCBA THERMAL BD DX850	2
18	55.J8623.001	PCBA CHIP BD PB6100	2
19	65.J7602.001	PL ZOOM PB7200 ASIA	R
20	71.08060.000	IC DMD 0.6SVGA 8060-624C 12DDR	R

Model : PB6100

Item	Component	Description	Type
21	31.J8601.001	BADGE AL PLATE PB6100	R
22	60.J1334.001	ASSY CAP LENS SL700X	R
23	60.J8603.001	ASSY F/C PB6100	R
24	55.J8611.001	PCBA PFC BD PB6100	2
25	55.J8613.001	PCBA FAN BD PB6100	2
26	65.J5003.001	FOOT ADJ DX850	R
27	44.J0502.005	CTN 415*325*255 PB6100/BENQ VI	R
28	47.J8605.001	CUSHION FRONT EPE PB6100	R
29	47.J8606.001	CUSHION REAR EPE PB6100 PB6100	R
30	50.72920.011	C.A MIN-DIN 4P S-VIDEO W/S 150	R
31	50.J0508.503	SIGNAL/C 15/15P 20276 1800MM	R
32	50.J1303.501	CABLE RCA Y/Y 1600MM BLK	R
33	56.26J86.001	REMOTE CR14AI PB6100	R
34	42.20019.002	BAG PE 250*350 LD FP741/NEC	R
35	46.00003.012	CARD WARRANTY 7254E	R
36	49.J8601.001	MANUAL USER PB6100/ PB6200	R
37	53.J8601.001	CD MANUAL USER PB6100/ PB6200	R
38	60.J8618.CG1	ASSY Service LAMP 200W/U PB6100	0
39	60.J8621.001	ASSY S2+ EGN 12D PB6100	0

Model : PB6200

Item	Component	Description	Type
1	55.J8501.001	PCBA MAIN BD PB6200	2
2	42.J8618.001	U/C PC+ABS PB6100	R
3	55.J7612.001	PCBA KEYPAD BD PB7200 BENQ850	2
4	54.J8612.001	BALLAST PHG201G16 PB6100	R
5	55.J5020.001	PCBA EMI BD DX850	2
6	60.J8605.001	ASSY L/C PB6100	R
7	55.J8608.001	PCBA REAR IR BD PB6100	2
8	23.10103.001	FAN 12V 70*70*25AXIAL ADDA	R
9	60.J8607.001	ASSY DOOR PB6100	R
10	23.10102.001	BLOWER 12V 50*50*20MM ADDA	R
11	60.J8617.001	ASSY LAMPBOX PB6100	R
12	55.J1313.001	PCB 1L SENSOR-B BD SL700 X MI	2
13	65.J8603.001	CW DIA44DEG110 PB6100 PRODISC	R
14	60.J8621.001	ASSY S2+ EGN 12D PB6100	0
15	55.J8623.001	PCBA CHIP BD PB6100	2
16	71.08060.000	IC DMD 0.6SVGA 8060-624C 12DDR	R
17	31.J7601.061	NAME PLATE AL PB6200	R
18	55.J5019.001	PCBA THERMAL BD DX850	2
19	60.J1334.001	ASSY CAP LENS SL700X	R
20	60.J8603.001	ASSY F/C PB6100	R

Model : PB6200

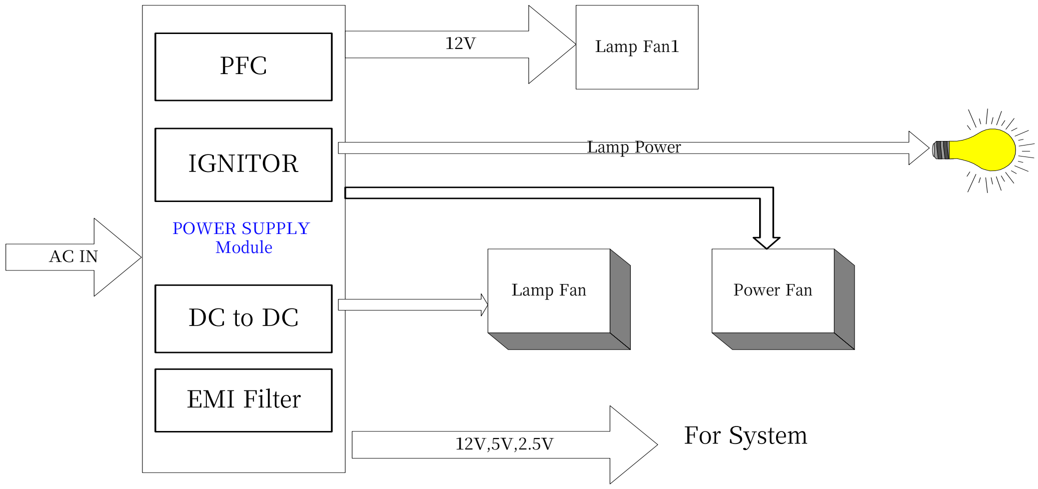
Item	Component	Description	Type
21	55.J8611.001	PCBA PFC BD PB6100	2
22	55.J8613.001	PCBA FAN BD PB6100	2
23	65.J5003.001	FOOT ADJ DX850	R
24	44.J7601.051	CTN AB PB6100/BENQ(VI)	R
25	45.L2701.011	LBL CTN 120*100 BLUE FP559	R
26	47.J8605.001	CUSHION FRONT EPE PB6100	R
27	22.91007.001	SKT PLUG 2/3P W/G	R
28	27.01818.000	CORD SVT#18*3C 10A125V 1830US	R
29	44.J0501.011	CTN ASSY 350*240*48 7765P	R
30	50.72920.011	C.A MIN-DIN 4P S-VIDEO W/S 150	R
31	50.J0508.503	SIGNAL/C 15/15P 20276 1800MM	R
32	50.J1303.501	CABLE RCA Y/Y 1600MM BLK	R
33	56.26J86.001	REMOTE CR14AI PB6100	R
34	46.00003.012	CARD WARRANTY 7254E	R
35	49.J8601.001	MANUAL USER PB6100/ PB6200	R
36	53.J8601.001	CD MANUAL USER PB6100/ PB6200	R
37	60.J8618.CG1	ASSY Service LAMP 200W/U PB6200	0

4. Block Diagram

PB6100 DMD projector being using the SGA DMD Engine made by BENQ, it included front end circuitry that digitizes and scaling processes for the input analog VGA and TV signals. As shown, in figure below the front end circuitry consists of :

1. Frond end Circuitry

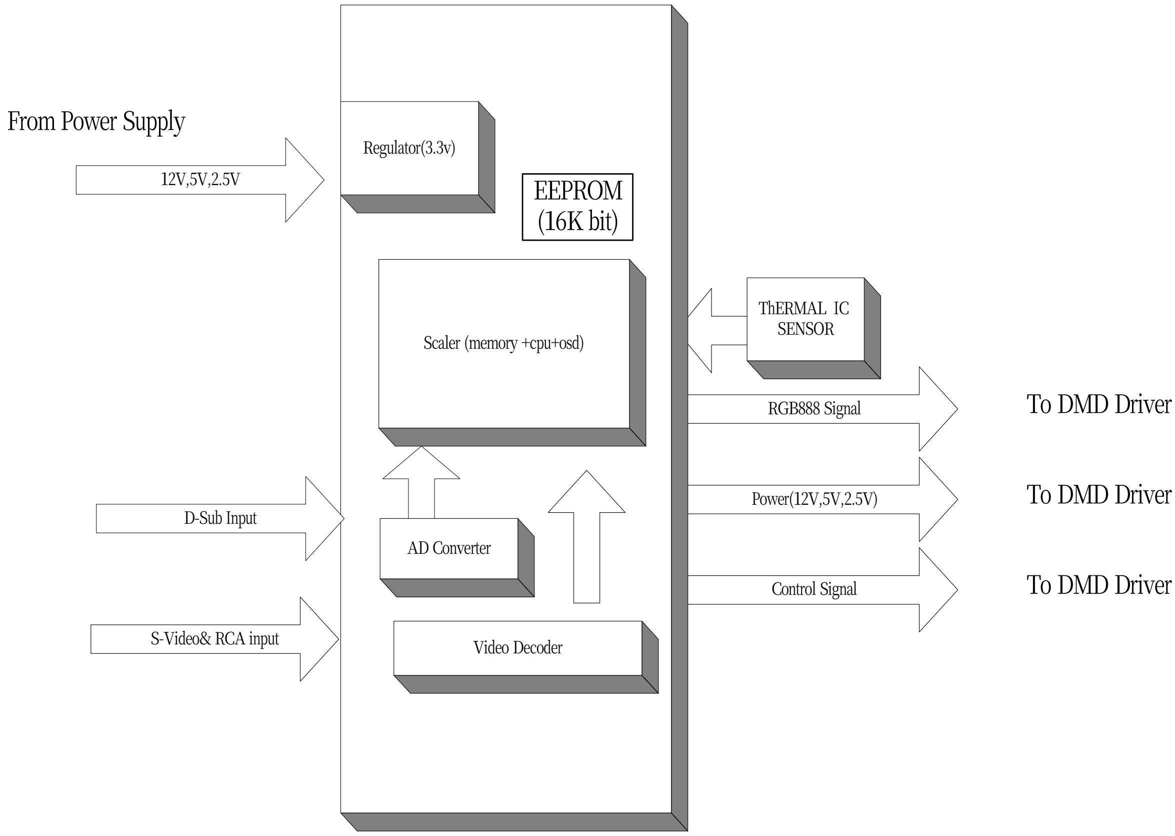
1.1 Power supply module include PFC and DC/DC portion. DC/DC portion provide 12V, 5V and 3,3V for whole system.



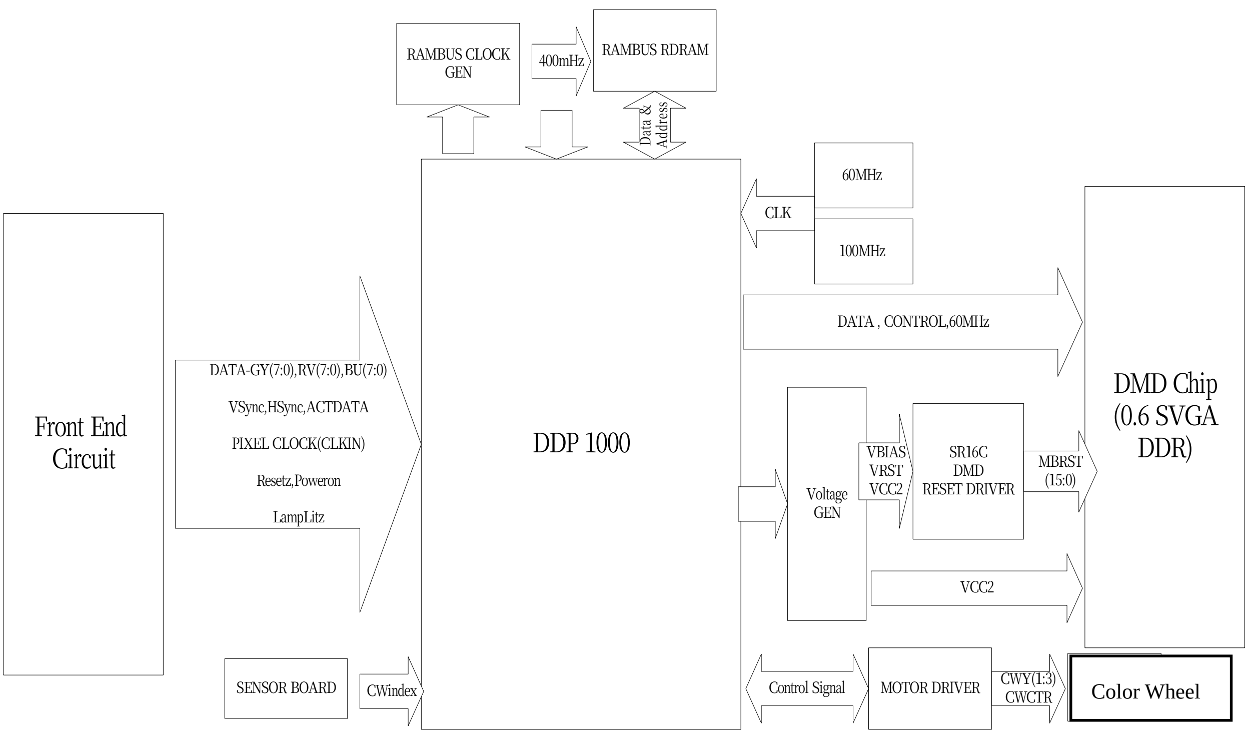
1.2 Pixelworks scaler(PW166) with x86 CPU, OSD and SDRAM is used for system control. It control whole system operation and with crucial role of this system.(Include fan speed, inter-lock SW,….)

1.3 A/D-decoder(AD9883) is used for decoding VGA analog signal to digital signal(RGB 888) which provide 24 bit true color resolution. It can accept SOG(sync on green) and composite signal for PC input. It also support YPbPr signal.

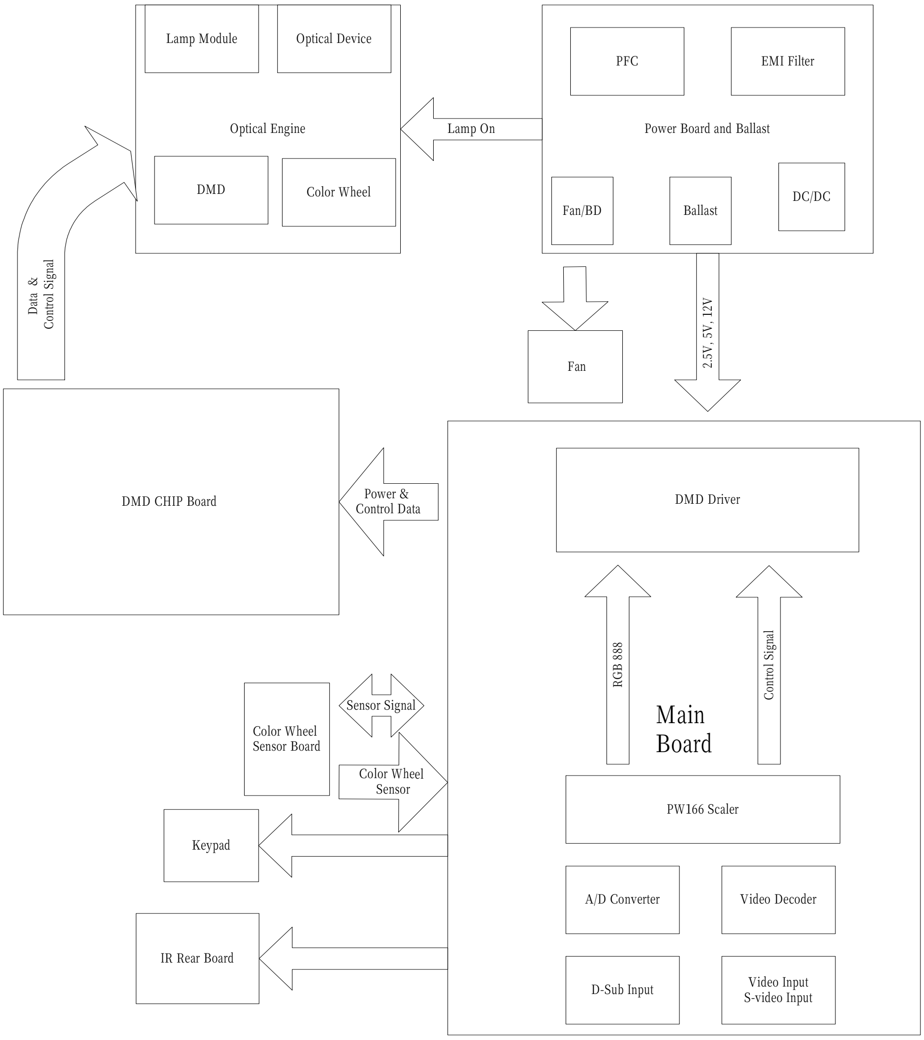
1.4 The video decoder that process TV video signal input. The TV video signal support both of composite and S-video input and output YUV format to scaler processor. The basic block as following.



2. DMD driver board that transfer PW166 scaler output RGB888 signal to DMD chip acceptable signal for driving DMD mirror operation. The relate diagram as below:



3. Whole system block diagram is show as below:



Overview

The Main Board of PB6100 is mainly composed of an ADC converter(AD9883) , a ImageProcessor(PW166) , a EEPROM(24C16) and a flash memory (MBM29LV800B) .

The input signal is analog RGB format , which comes from the standard VGA D_SUB connector , the analog signal input to ADC converter , which output RGB digital data stream to Image Processor .

The Image Processor also known as “Scaler” , which indicate its main function , expand or downsize the digital picture from ADC to a fixed size digital image output .

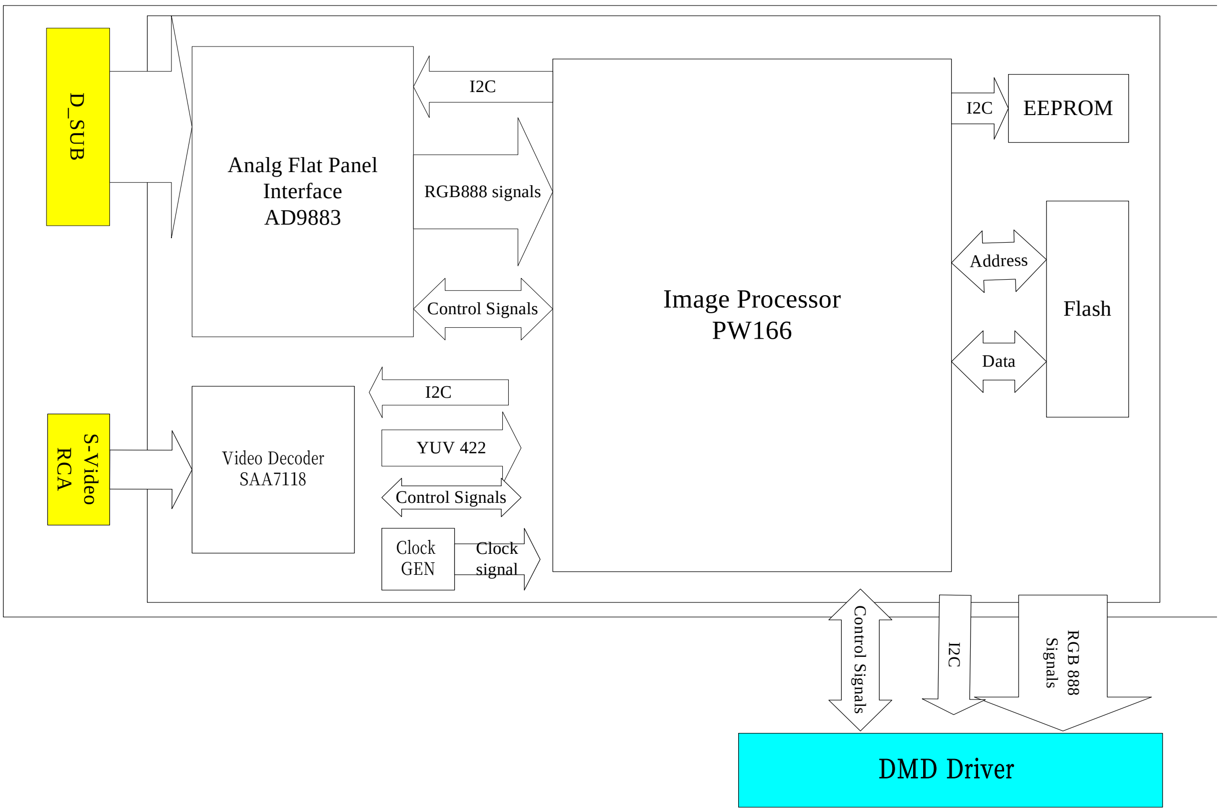
The CPU which control the whole system is embedded inside the Image Processor , there is also a Real Time Operating System which incorporates with the CPU as hardware layer interface .

The EEPROM stores the system information such as brightness , contrast …which ensure the system operates under the most user friendly circumstance .

The Flash memory stored the Software Program which control the system , the CPU will read the Flash as its execution command .

Block Diagram

Below is the simple block diagram of PB6100 Main Board .



As the diagram shown above , here is the function of every discrete blocks .

- **D_SUB input**

  Analog RGB data input , the standard maximum analog input resolution is SXGA .There also some interface signals from the VGA cable , they are

  ADHSYNC – Providing the Horizontal Synchronization signal to AD9883.

  ADVSYNC - Providing the Vertical Synchronization signal AD9883.

  DDC interface – Providing Digital Display Channel , which include VCC(Pin9) , SCL(Pin15) , SDA(Pin12) .

- **Analog Flat Panel Interface (ADC Converter) , AD9883**

  The ADC converter digitizes the input analog RGB data signal from D_SUB and output the digital data streams to Image Processor .

  The normal voltage level of analog RGB input signals is about 0.7V , while the ADC digital signal output to Image Processor is LVTTL level , about 3.3V.

  The ADC , AD9883 could supports up to pixel rate at about 140MHZ , which is about SXGA 75HZ analog input signal .

There are some other interface signals related to AD9883

SOGIN – Sync On Green input from Image Processor , the signal enable the PB6100 support the very special VGA input signal .

GCOAST – Input signal from Image Processor , the signal enable the PB6100 support the Machintosh analog input format .

GCLK – Output to Image Processor as Pixel Clock , providing the reference clock for Image Processor .

GHS – Providing the Horizontal Synchronization signal to Image Processor .

GVS - Providing the Vertical Synchronization signal to Image Processor .

GRE,GGE,GBE – Digital data stream to Image Processor which is higher than SXGA 75HZ .

. Image Processor (PW166)

The most important IC is the image Processor , here below list its main function

- Supporting input digital data stream up to UVGA and output digital data up to SXGA
- Two input port , which are Graphic port (VGA format) and Video port (video decoder format) .
- Frame rate conversion , the output frame rate is independent from the input frame rate and the most important feature of the Image Processor is memory inside , there is no need of external memory for frame rate convertion .
- Up and Down scaling of different input resolution , ensure the same output image size .
- Providing Bitmap OSD picture , which if more fancy than normal OSD chip .
- On chip Microprocessor

The Image Processor is a highly integrated circuit , it include MCU , Scaler , Memory , OSD . This will increase the stability of the system .

There is some control signals list below

DCLK – pixel clock output to DMD driver BD , provided as a reference clock for DMD driver

DVS – Vertical synchronization signal output to DMD BD , provided as Vertical reference signal for DMD driver .

DHS – Horizontal synchronization signal output to DMD BD , provided as Horizontal reference signal for DMD driver .

DEN – Data enable signal output to DMD BD , provided as a valid data indicator signal for DMD driver .

VCLK – V-port pixel clock .

VPEN – V-port data enable .

VVS – V-port Vertical Synchronization .

VHS – V-port Horizontal Synchronization .

VFILED – V-port Even/Odd frame indicator .

RESETZ – Output to DMD driver BD as RESETZ signal for DMD normal operation .

ABNORMAL – Input to CPU for indicating abnormal condition , if the CPU detects an

abnormal status , it will disable lamp ignition .
POWERON – Output to power to enable the other power source into normal working situation .
LAMPLIT – Input signal as an indicator that the Lamp is ON or OFF
LED1, LED2 – Output to enable the LED ON or OFF .
IRRCVR0 – System IR input to CPU as remote control signals .
MCKEXT – Memory clock to CPU .
DCKEXT – Data clock to for Scaling .
I2C_SDA , I2C_SCL – I2C format data transfer line .

. EEPROM

Store the system information for user friendly .

. Flash Memory

System software was stored in this chip , the memory size is 8M bits

. DDP1000

The DDP1000 transfer signal from PW166 to DMD for driving DMD mirror operation.

. Direct Rambus Memory

The DDP1000 utilizes a high speed Direct Rambus Memory. To support the RDRAM a Direct Rambus clock generator CDCR83 is utilized. It can transfer input clock from 50MHz to 400MHz.

IR Receiver schematic:

The IS1U621 is miniaturized receivers for infrared remote control systems. PIN diode and pre-amplifier are assembled on lead frame, the epoxy package is designed as IR filter. The demodulated output signal can directly be decoded by a microprocessor. The main benefit is the reliable function even in disturbed ambient and the protection against uncontrolled output pulses.

Electronic System Protection for abnormal state:

The circuit of electronic system protection for abnormal state is used for the hardware light off and power off in abnormal state of thermal and safety issues. If the protection function is active then the software system will detect the abnormal signal.

Sensor BD:

The Sensor BD provides the color wheel index signal to DMD BD. The CWINDEX shall indicate the beginning of the red light on the DMD device. The phase of the display data on the DMD based on the CWINDEX signal. It can be configured to delay the CWINDEX for electronic alignment of the color wheel. The timing of CWINDEX and the delayed CWINDEX is shown in Figure 1.

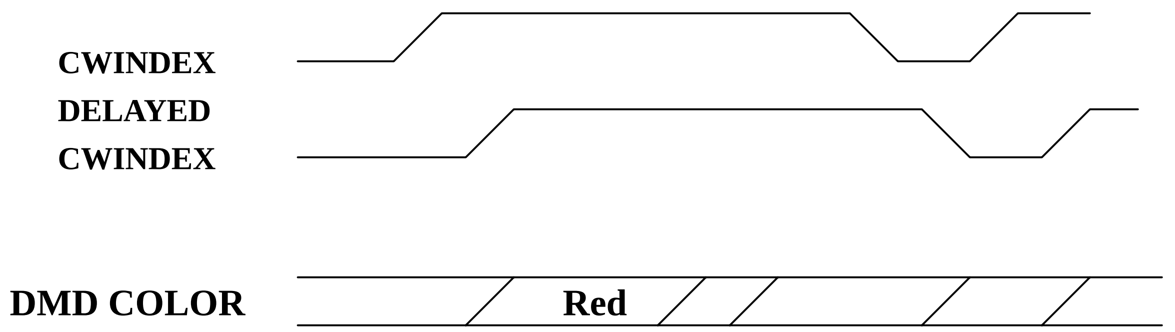


FIGURE 1

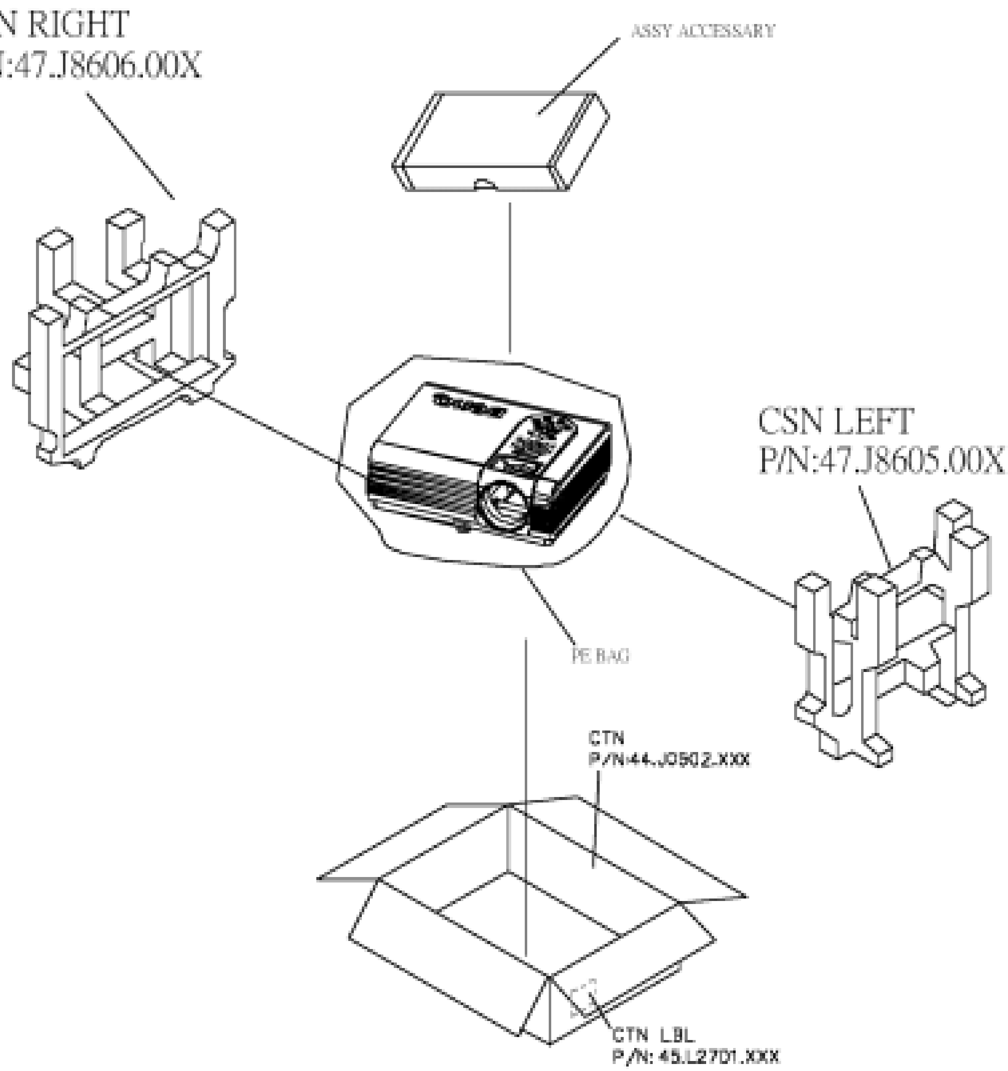
PB6100 Lamp on Sequence

Signal	Voltage Change	Description
POWERON	Low→High	1. This signal should go from low to high after all the DC supplies are within spec. Then RESETZ can go high. 2. After the power key pressed 3 second continuously, the POWERON signal will activate.
RESETZ	Low→High	DMD is working, when the DMD reset.
LAMPEN	Low→High	Lamp lights up.
LAMPLIT	Low→High	Indicate ”Lamp on”.

PB6100 Normal Lamp off Sequence

Signal	Voltage Change	Description
RESETZ	High→Low	DMD is off.
LAMPEN	High→Low	Lamp is off.
LAMPLIT	High→Low	Indicate “lamp off“.
POWERON	High→Low	Power down the system, but the peripherals of the CPU still power on.

5. Packing Description



1. CARTON SIZE:

INTERNAL DIMENSION : 415 ＊ 325 ＊ 255 mm

EXTERNAL DIMENSION : 425 ＊ 333 ＊ 272 mm (l * w * h)

OUTSIDE DIMENSION : 435 ＊ 345 ＊ 287 mm (L * W* H)

2. SHIPPING CONTAINER

40' CONTAINER DIMENSION : 11980* 2330 * 2360 mm (L * W * H)

20' CONTAINER DIMENSION : 5900 * 2340 * 2360 mm(L * W * H)

3.

	20' (SETS)	40' (SETS)	AIR BY PALLET A	
WITH PALLET	504	1092	30	

4. PALLET SIZE (W*L*H)

PALLET A : 1035*870*130 (mm)

Reason For Release:

First release

Item	Contents	Q'ty	Unit
1	PACKING DESCRIPTION Please Take 99.J8677.B12 as standard	1	PAGE
2	LBL PRINTING		
3	Container Loading Please Take 99.J8677.B12 as standard		

Prepared byV40/Jessica Chan 10-7-2003

CTN LBL PRINTING:

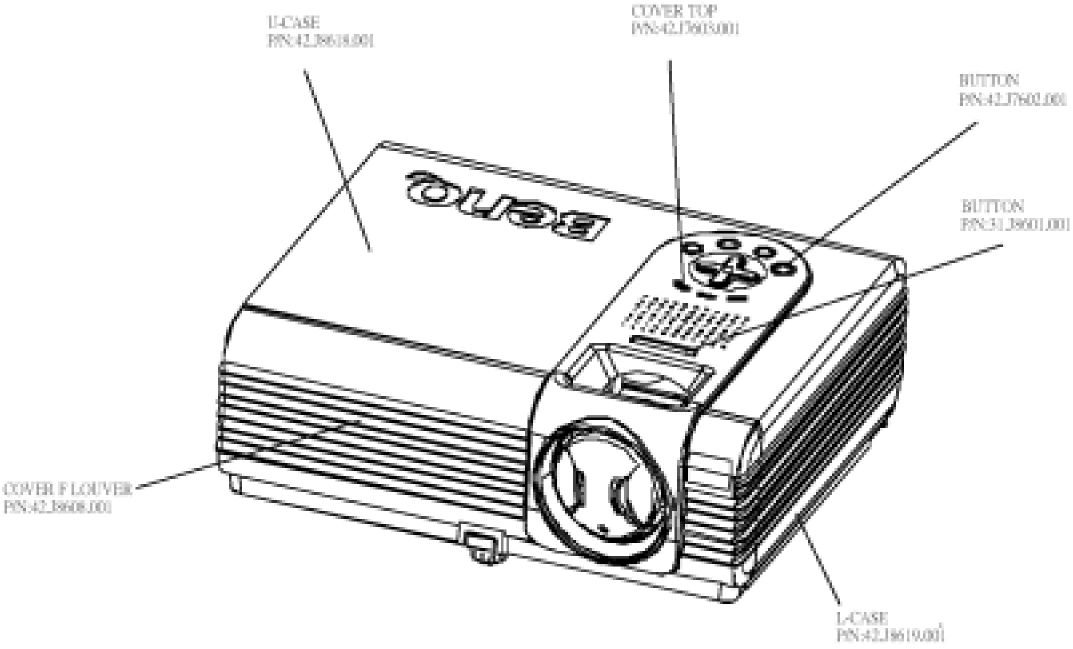


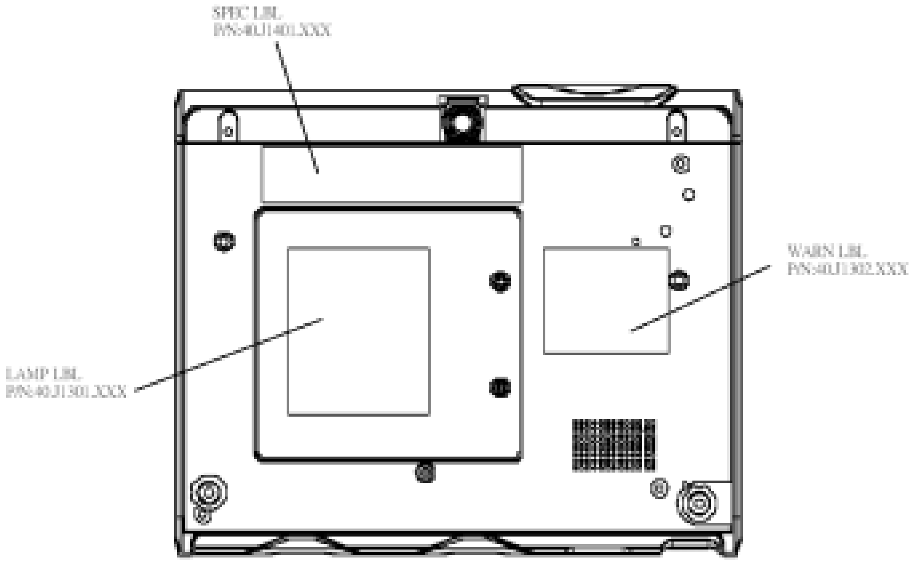
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CTN LBL PRINTING:



P/N:45.L2701.011

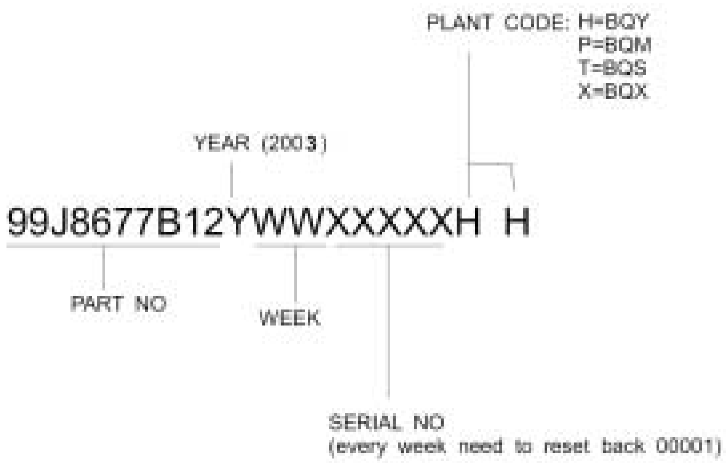

U-CASE
P/N:42.J8618.001
COVER TOP
P/N:42.J7603.001
BUTTON
P/N:42.J7602.001
BUTTON
P/N:31.J8601.001
COVER F LOUVER
P/N:42.J8608.001
L-CASE
P/N:42.J8619.001


SPEC LBL
P/N:40.J1401.XXX
WARN LBL
P/N:40.J1302.XXX
LAMP LBL
P/N:40.J1301.XXX

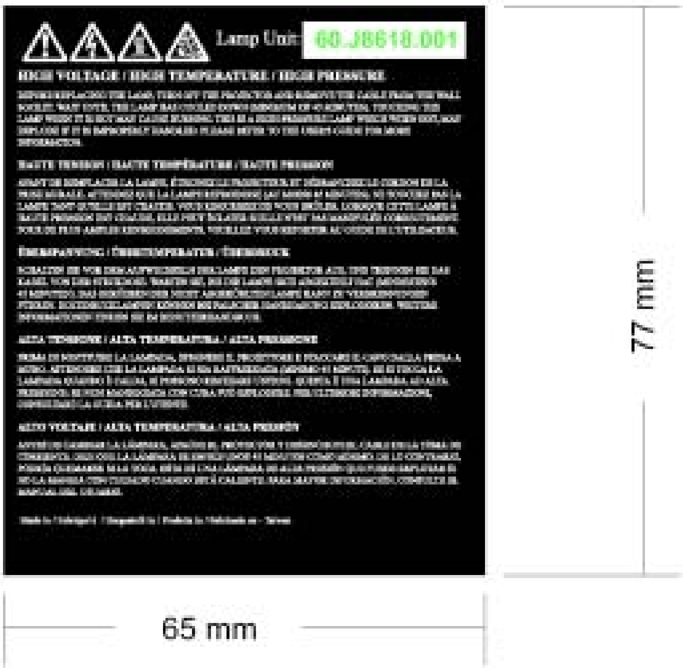
1. SPEC LBL PRINTING



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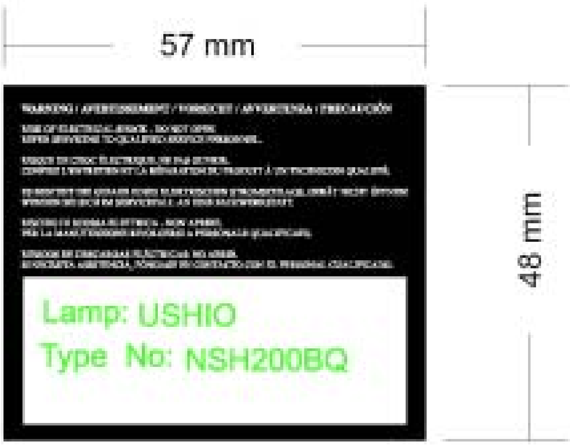


2. LAMP LBL PRINTING



P/N:40.J1301.003

3. WARN LBL PRINTING



P/N:40.J1302.002

6. Factory Menu

1. **How to enter factory menu:**

   I. **Hold press "UP" button until the "Lamp hours info." OSD display on bottom-right of screen (Fig-1)**

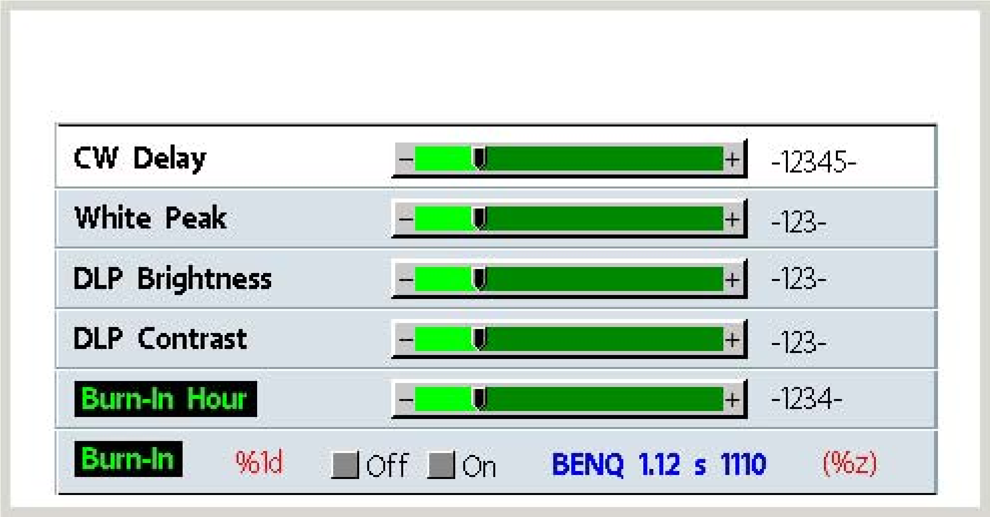


(Fig-1) Lamp Hours Info

   II. **Press keypad <Power> and <Blank> key simultaneously again, then enter Factory menu.**

2. Factory layer:

I. DMD layer (Fig-3):



(Fig-3) DMD layer

1.CW delay: Adjust color wheel delay.**(Note this value before upgrade software)**

2.White peak: Adjust DMD white peak.

In PC mode default value set **10**, in Video mode is **0**.

Software auto set this value as source find.

3.DLP Brightness: Adjust DLP Brightness.

Default setting is **36**.**Do not change this value.**

4.DLP Contrast: Adjust DLP Contrast.

Default setting is **30**.Do not change this value.

5.Burn-In Hour: set how many hours to burn-in.

Projector will enter burn-in mode on next selection.

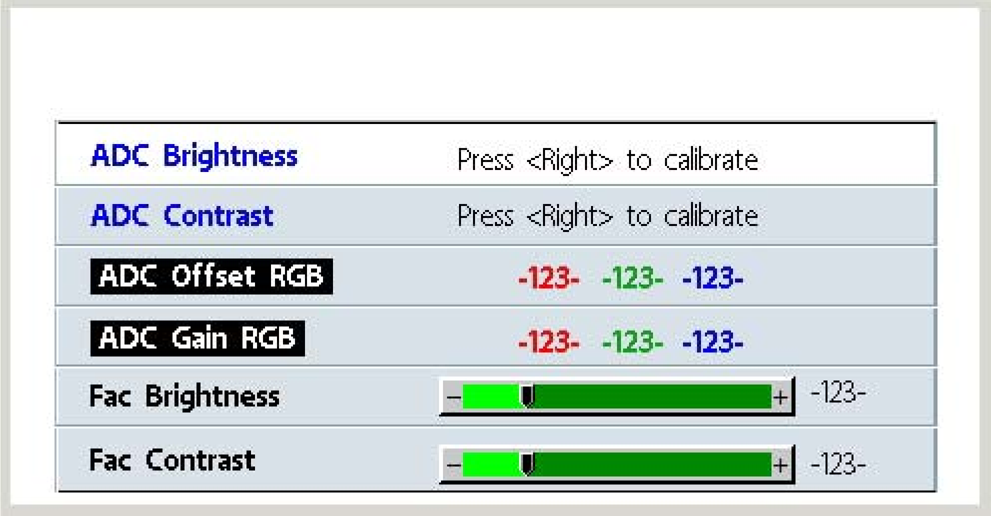
6.Burn-In: After you set burn-in hours, set this selection to "**On**" and system will enter going to burn-in immediately.

Projector will run color change (Red, Green, Blue, Black, White) on screen.

System will auto turn off after burn-in hour count down to 0 and burn-in complete.

(You can also cancel burn-in sequence by set this selection to "**Off**").

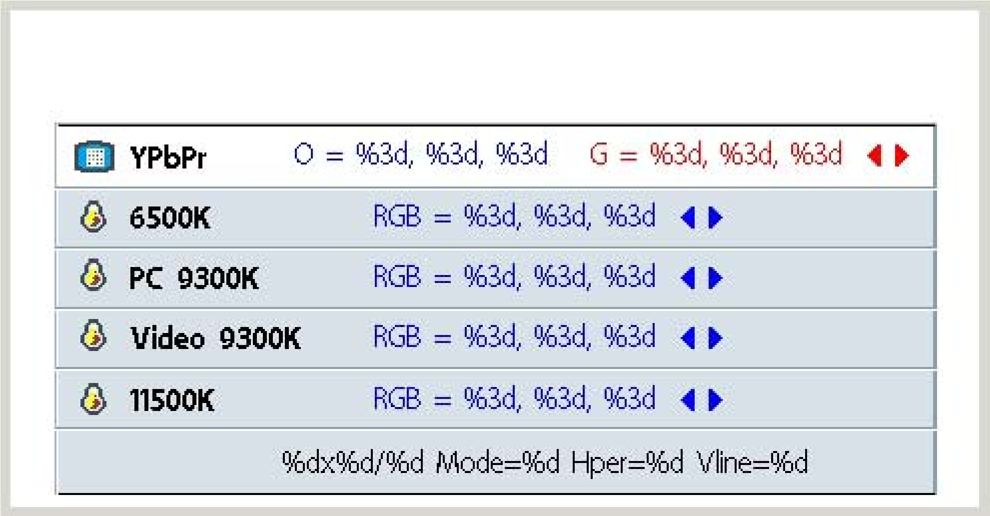
II. ADC layer (Fig-4): (only available when input source is analog RGB)



(Fig-4) ADC layer

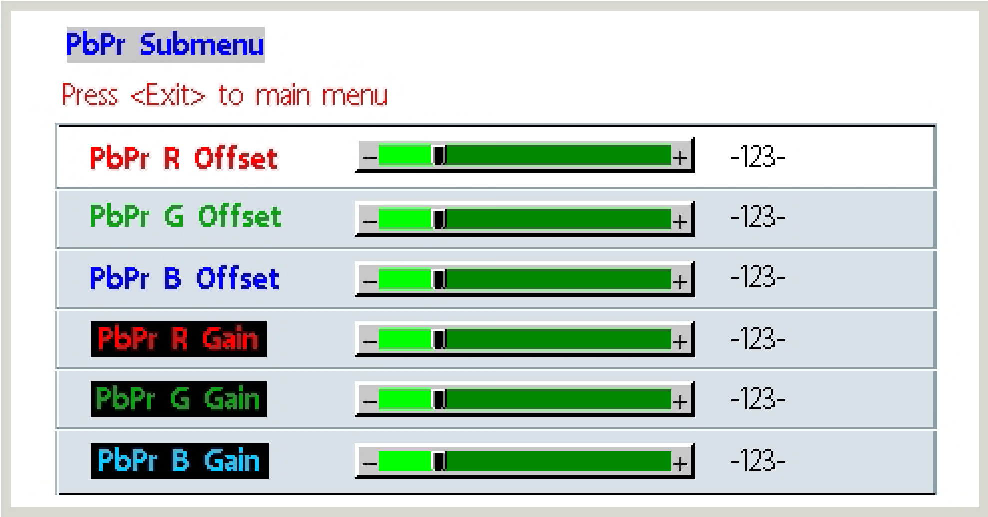
1. **ADC Brightness:** ADC brightness auto calibration black.
2. **ADC Contrast:** ADC contrast auto calibration white.
3. **ADC Offset RGB:** value to tell you calibrate result.
4. **ADC Gain RGB:** value to tell you calibrate result.
5. **Fac Brightness:** adjust default brightness value in source PC.
6. **Fac Contrast:** adjust default contrast value in source PC.

III. Color layer (Fig-5):



(Fig-5) Color layer

1. **PbPr:** enter PbPr color control Layer.



When Source is YPbPr (Never Change these setting)

(Note these values Before Upgrade Software)

PbPr G Offset : combine with user OSD brightness in YPbPr

PbPr G Gain: combine with user OSD contrast in YPbPr

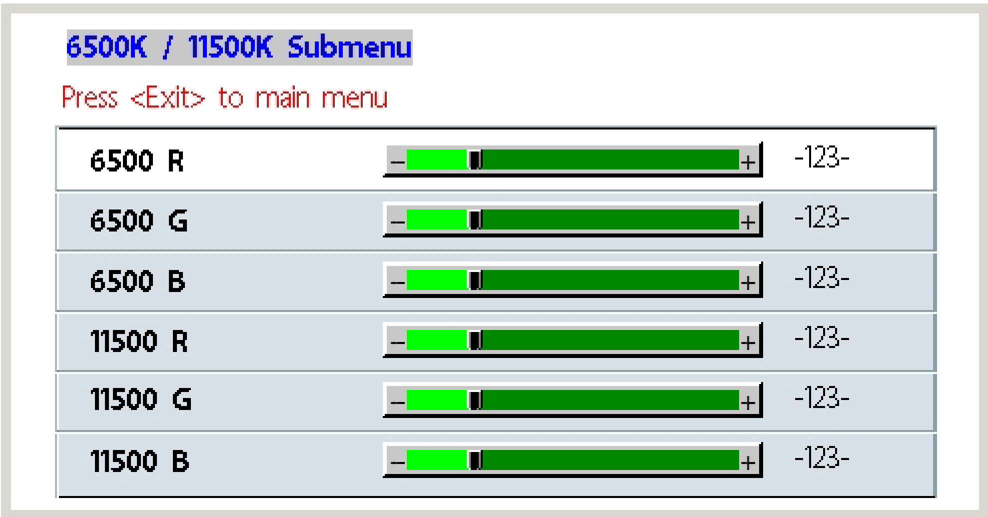
PbPr R Offset: offset of color red

PbPr G Offset: offset of color green

PbPr R Gain: saturation R

PbPr B Gain: saturation B

2. **6500,11500 R,G,B:** 6500K/11500k submenu



(Never Change these setting)

6500 R :gain of color red while color temp is 6500

6500 G :gain of color green while color temp is 6500

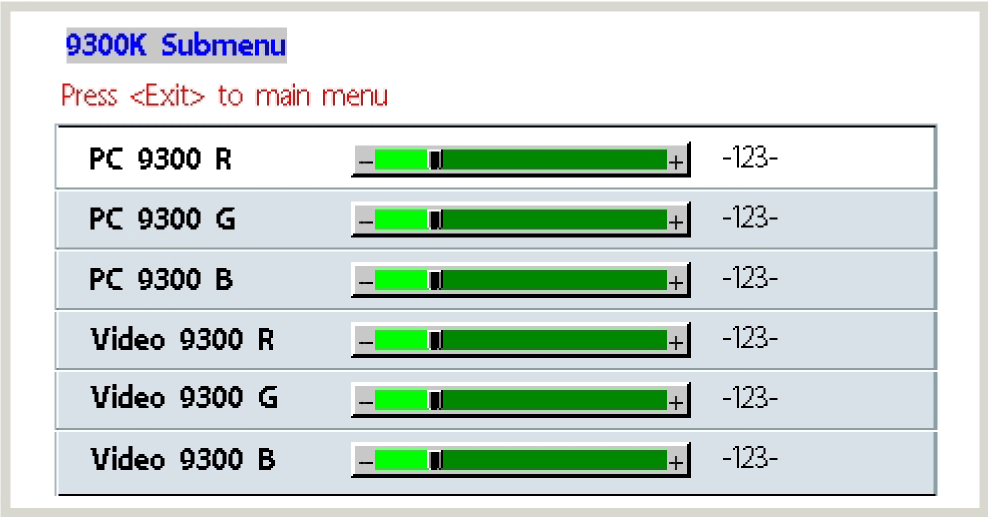
6500 B :gain of color blue while color temp is 6500

6500 R :gain of color red while color temp is 11500

11500 G :gain of color green while color temp is 11500

11500 B :gain of color blue while color temp is 11500

3. **PC 9300 and Video 9300: 9300K submenu**.



(Never Change these setting)

PC 9300 R :gain of color red while PC color temp is 9300

PC 9300 G :gain of color green while PC color temp is 9300

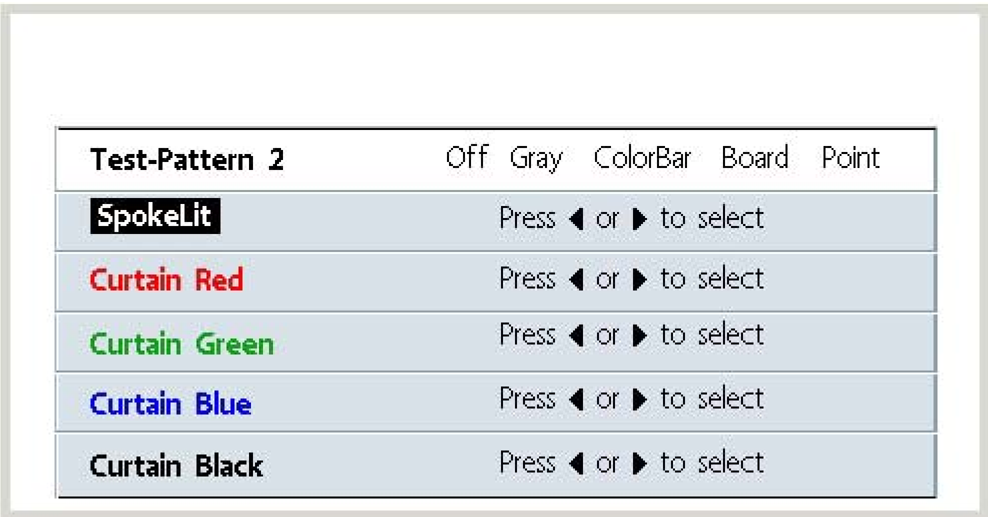
PC9300 B :gain of color blue while PC color temp is 9300

Video 9300 R :gain of color red while Video color temp is 9300

Video 9300 G :gain of color green while Video color temp is 9300

Video 9300 B :gain of color blue while Video color temp is 9300

IV. Optic layer (Fig-5):

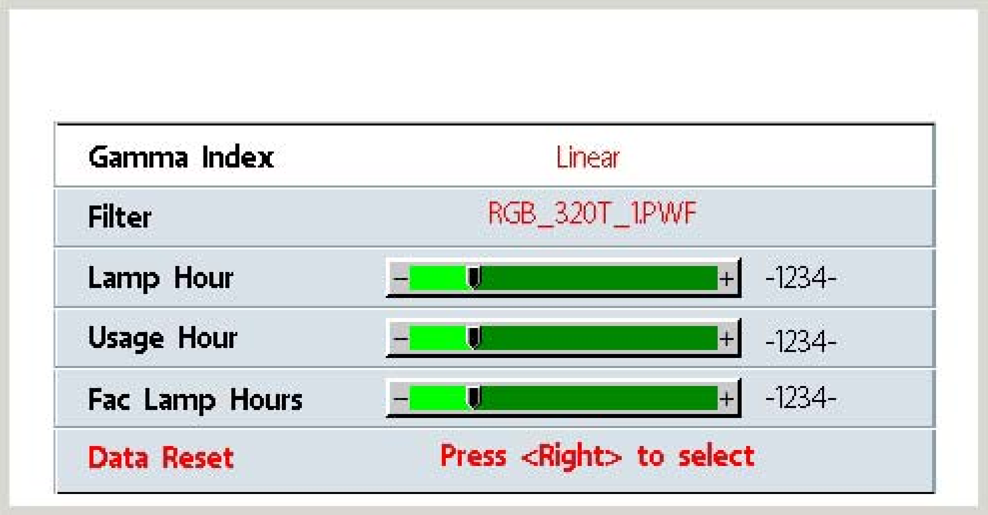


(Fig-5) Optic layer

1. **Test Pattern:** system auto produce pattern for engineer test.
2. **Spoke light:** unit display full white.
3. **Curtain Red:** unit display full color red.
4. **Curtain Green:** unit display full color green.

5. **Curtain Blue:** unit display full color blue.

V. Lamp layer (Fig-6):



(Fig-6) Lamp layer

1. **Interpolation:** De-interlace Mode
2. **Filter:** system auto select Filter.
3. **Lamp Hour:** value to tell you lamp usage hours.
4. **Usage Hour:** value to tell you unit usage hours.
5. **Fac Lamp Hours:** Record all of the amp usage hours
6. **Data Reset:** Reset all data to default include factory assign value.

Never try to reset all data.

VI. Others layer (Fig-7):

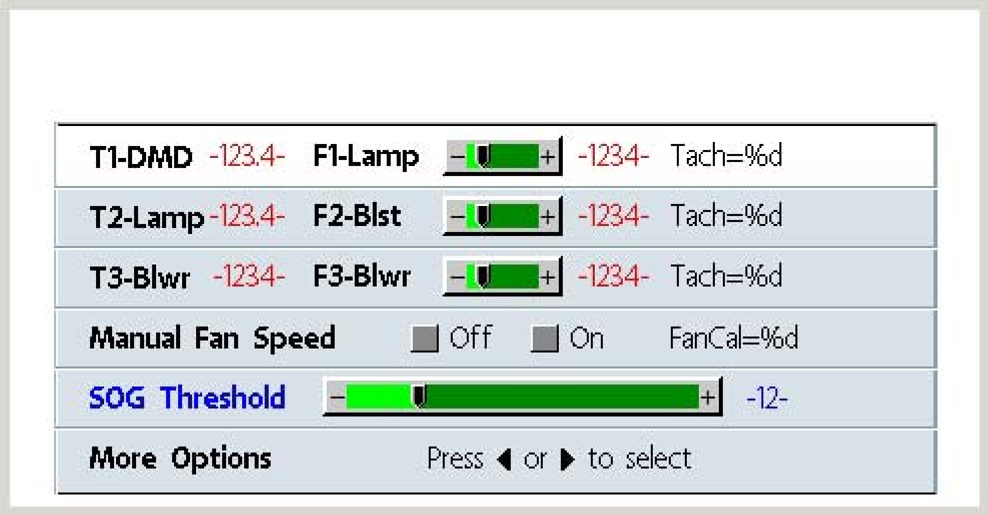


(Fig-7) YPbPr layer

1. **Gamma index:** system auto select DLP gamma index
2. **Gray value:** adjust here to check DMD fail pixel.

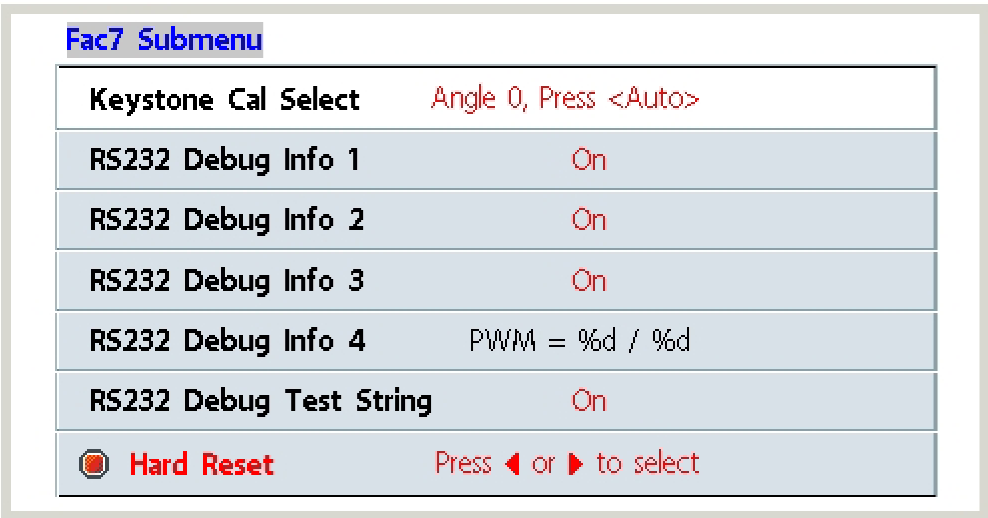
3. **Blue value:** adjust here to check DMD fail pixel.
4. **Scaling:** tell you what scaling mode is using now.
5. **Pc/PbPr Mode:** index of input timing
6. **RS232:** Enable / Disable RS232 control

VII. FAN Layer.



T1-DMD: DMD sensor temperature
T2-Lamp: Lamp sensor temperature
T3-Blwr: Blower sensor temperature
F1-Lamp: Lamp fan speed in RPM
F2-Blst: Blaster fan speed in RPM
F3-Blwr : Blower fan speed in RPM
Manual Fan Speed: Change fan speed by manual.
SOG Threshold : Change SOG threshold level of AD
More Options: Change to Fac7 submenu

(Fac7 Submenu)



(This menu only for control testing)

7. Firmware upgrade procedure

PB6100/PB6100 Download Procedure

Hardware required

1. D-sub download cable (full ping D-SUB P/N : 50.J2402.201)
2. Download board (P/N : 55.J1316.001)
3. PS2 Download cable from download BD to PC (P/N : 50.J0510.5D1)
4. (Cable/RS232D MD8PM/DS9PF 1800MM)
5. Adaptor for Download BD (DC12 V)
6. DVD player with YPbPr (Progressive) output
7. PC timing/pattern generator
8. Personal computer or laptop computer

Software required

1. FlashUpgrader.exe (or **FlashUpgraderNT.exe** if you're using **Windows NT®**)
2. pwSDK.inf
3. romcode.hex
4. configdata.hex
5. gui.hex
6. flasher.hex

Download procedure

1. Record **CW delay** value in factory page 1 on the unit to be upgraded.

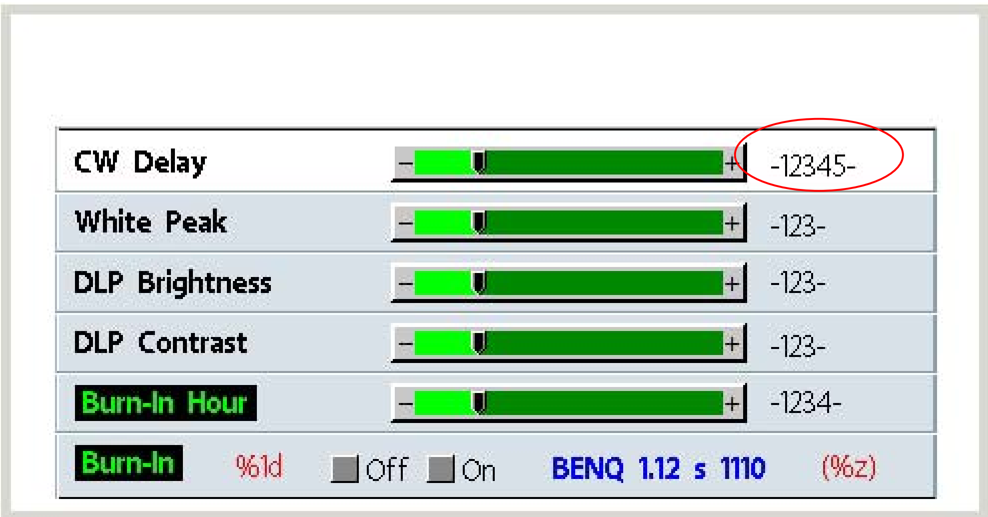


Fig. 1

2. Record all Color Temperature values in factory page 3.

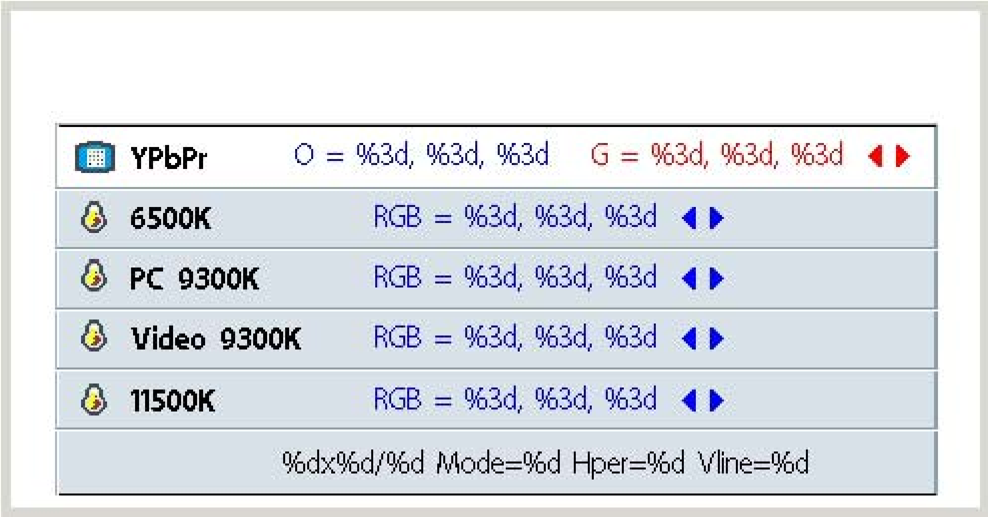
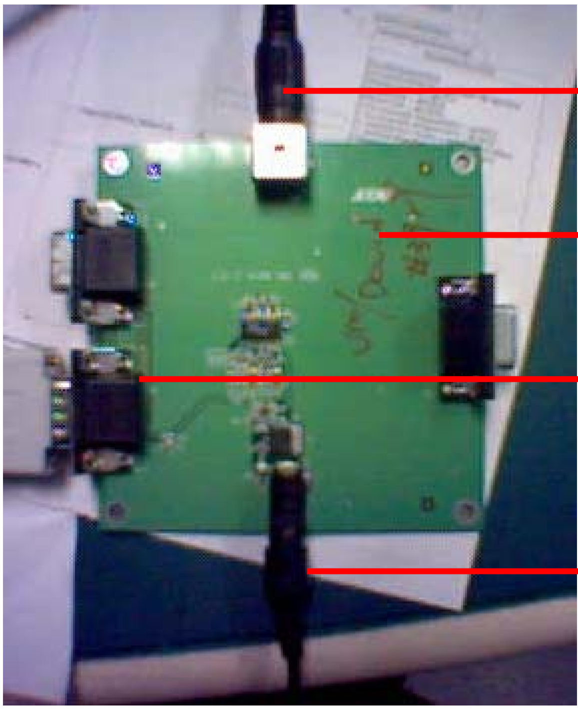


Fig. 2

3. Power down the projector and turn the power switch off after cooling.
4. Setup the download board as Fig. 3



PS2 Download cable to PC
P/N : 50.J0510.5D1

Download BD
P/N : 55.J1316.001

D-Sub connector to Projector
P/N : 50.J2402.201

Power supply DC 12 V

Fig. 3

5. Connect the D-Sub to PC input of Projector.

6. Run FlashUpgrader.exe and open the file pwSDK.inf. You can browse to locate it. Select the correct COM port and use 115200 as the BAUD rate.(as Fig. 4)

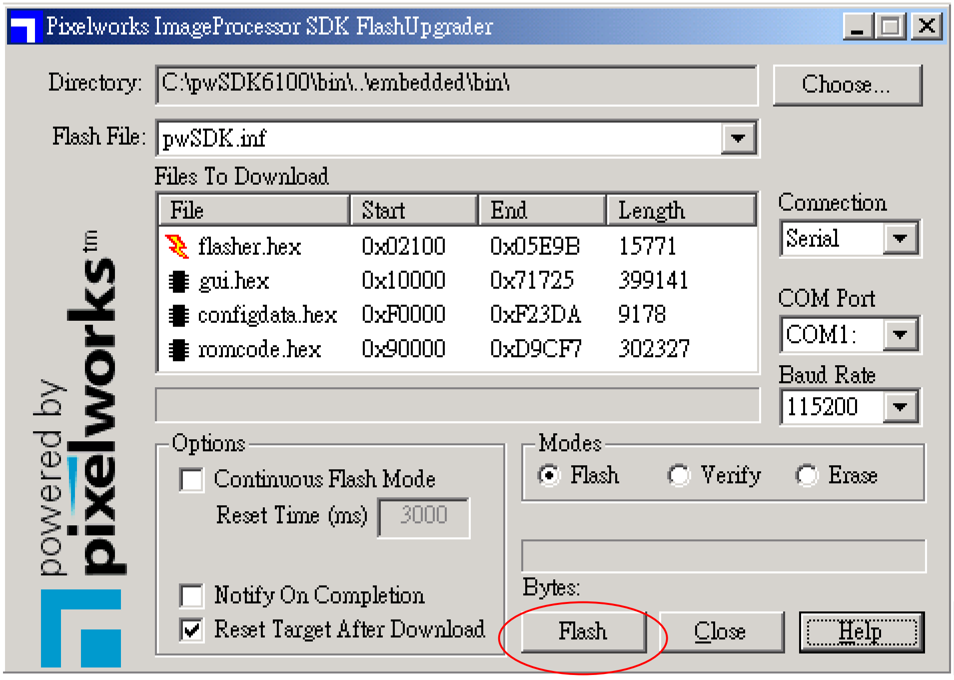


Fig. 4

7. Press the "Flash" button , and then turn on the power switch. (as Fig. 5)

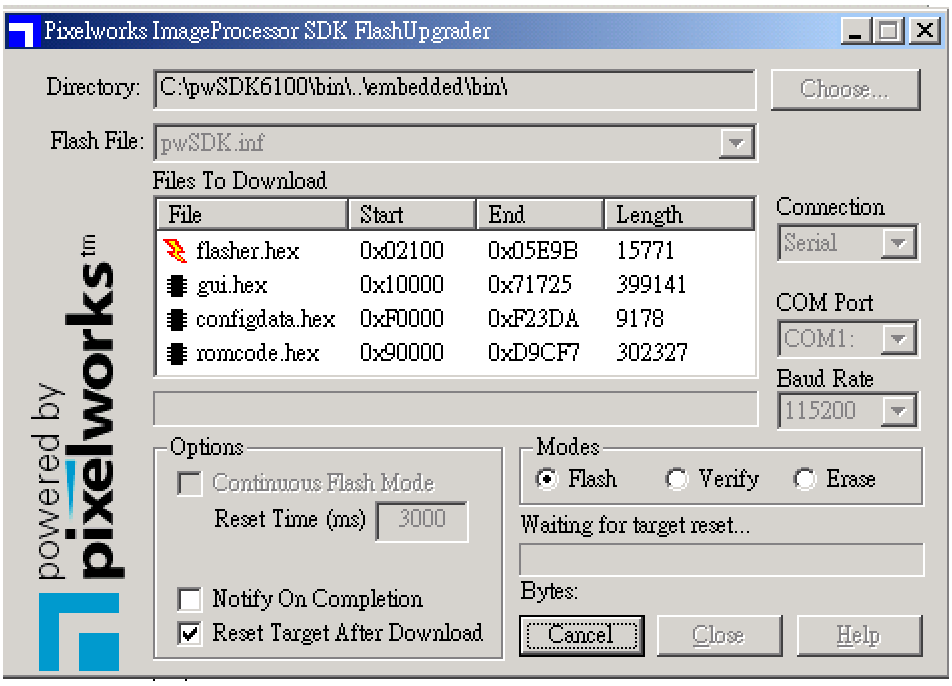


Fig. 5

8. Now the progress bar in the FlashUpgrader should be running.

9. Download is complete ,Pls turn off power switch , and turn ON power switch.

10. Power on projector and the factory settings should be restored.

Calibration procedure

1. Use any video pattern generator to output XGA 60Hz PC timing with 32 grayscale pattern. Enter the factory OSD page 2 and execute **ADC Brightness** and **ADC Contrast**.(as Fig. 6)

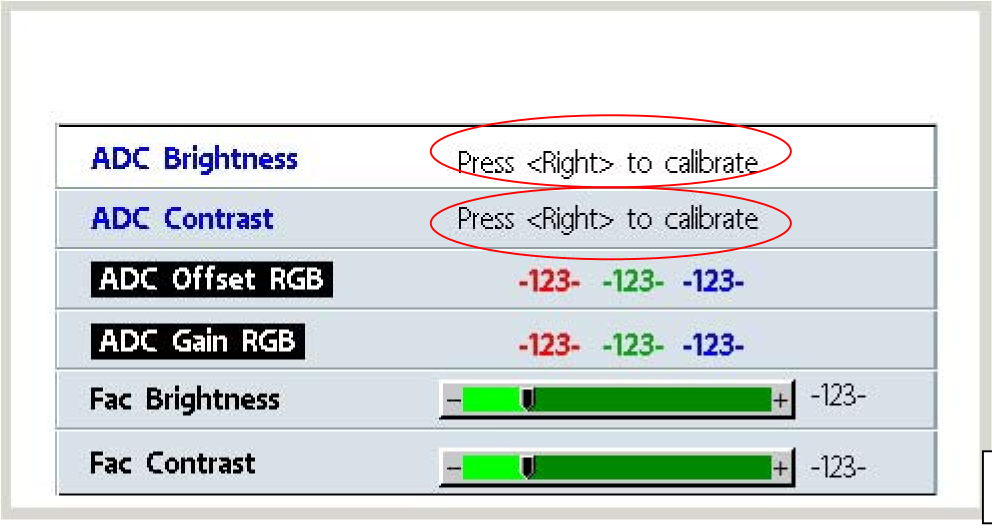


Fig. 6

2. Restore **CW delay** value and color temperature values.

Verification

Check the version number in the factory OSD page 1.(as Fig. 1)

8. RS232 Communication Protocol / Codes

External Communication Protocol

External communication protocol include two parts：A. setup connecting, B. send command.

BenQ default Serial Port :
Baud Rate: 19200
Parity: none
Data bits: 8
Stop bits: 1
Flow Control:none

A. Setup Connecting

A typical Packet transaction session is shown in Figure 1

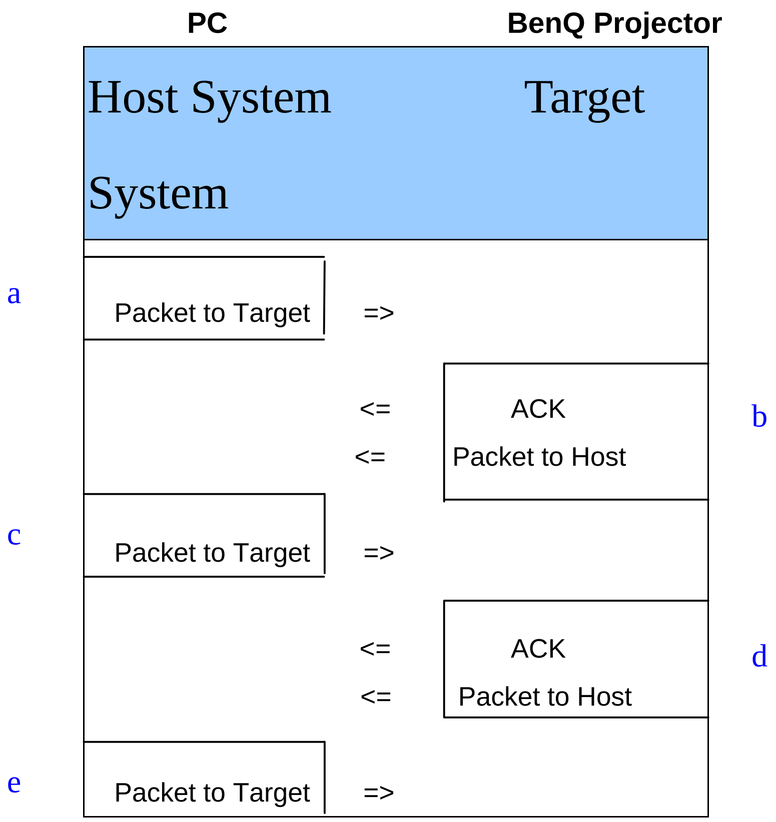


Figure 1

a. 1st Packet to Target (BenQ PB6XXX) structure like as below (Table 1)

Packet Header	Byte0	0xBE	Magic Number
	Byte1	0xEF	
	Byte2	0x01	Packet Type
	Byte3	0x05	Packet size (Low)
	Byte4	0x00	Packet size (High)
	Byte5	0xD1	CRC (Low)
	Byte6	0xFA	CRC (High)
Packet Payload	Byte7	0x01	System Info Type
	Byte8	0x02	Version Number
	Byte9	0x00	
	Byte10	0x00	Object ID
	Byte11	0x00	Level

Table 1

b. The Ack of Packet to Host (PC) (Table 2)

Ack	Byte0	0x1E	PAK
Packet Header	Byte1	0xBE	Magic Number
	Byte2	0xEF	
	Byte3	0x01	Packet Type
	Byte4	0x05	Packet size (Low)
	Byte5	0x00	Packet size (High)
	Byte6	0xD1	CRC (Low)
	Byte7	0xFA	CRC (High)
Packet Payload	Byte8	0x01	System Info Type
	Byte9	0x02	Version Number
	Byte10	0x00	
	Byte11	0x00	Object ID
	Byte12	0x00	Level

Table 2

PAK means that PC will follow the received Packet data

c. Packet same as 1st Packet (Table 1)

d. Same as Ack (Table 2)

e. Packet to Target (BenQ PB6XXX) structure (Table 3)

Packet Header	Byte0	0xBE	Magic Number
	Byte1	0xEF	
	Byte2	0x01	Packet Type
	Byte3	0x05	Packet size (Low)
	Byte4	0x00	Packet size (High)
	Byte5	0xA9	CRC (Low)
	Byte6	0xC6	CRC (High)
Packet Payload	Byte7	0x00	System Info Type
	Byte8	0x00	Version Number
	Byte9	0x00	
	Byte10	0x00	Object ID
	Byte11	0x00	Level

Table 3

B. Send Command

1. Introduction

Command packets consist of “Header” and “Payload”. The Packet Header is consistent for all packets. The Packet Payload type and content varies based on the type of packet sent. The entire packet size is variable, being the sum of the fixed-size Packet Header and variable-sized Packet Payload.

Packet Header (fixed size)	Packet Payload (variable size)

Figure 2 Packet Format

Packet Header Format

All Packets use the same Packet Header format illustrated Figure 3.

Byte 0	1	2	3	4	5	6
Magic Number		Type	Packet Payload Size		CRC	
0xBE	0xEF	type	size_lo	size_hi	crc_lo	crc_hi

Figure 3 Packet Format

The Packet Header size is fixed at seven bytes (Intel byte ordering is used). The following code fragments are taken from these source files

The Packet Header definition is shown below:

```
typedef struct
{
   BYTE ePacketType; // type of the payload
   WORD nPacketSize; // size of the payload
   WORD nCRCPacket; // CRC for the entire packet
} PACKET_HEADER;
```

Magic Number

The Magic Number is a fixed value that is used to insure packet alignment if there are partial packets received or bytes lost. The Magic Number is a WORD in length (2 bytes). The Magic Number value is *0xEFBE*. Because Intel byte ordering is used, the ls-byte of the word is sent first (byte0 = 0xBE), then the ms-byte (byte1 = 0xEF).

Packet Type

The Packet Type (ePacketType) is a BYTE in length number that defines the type of data in the packet. The following entries are valid packet typess:

Table 4 Packet Types

Packet Type Name	Packet Type Number	Description
pt_INVALID	**0**	Invalid Packet Type
RESERVED	**1**	RESERVED
pt_EVENT	**2**	Host can send any event defined in BenQ PB6XXX software.
pt_OPERATION	**3**	Host can send any operation defined in BenQ PB6XXX software.

Packet Payload Size

The Packet Payload Size (nPacketSize) is a BYTE that defines the size of the Payload portion of the packet. If the packet contains only header information, this is zero. Therefore, the total byte count of any packet = nPacketSize plus 7 (since the Packet Header is seven bytes long).

Packet Checksum (CRC)

Each packet is CRC'ed using the tables later in this document. This number is the CRC value for the complete packet including the Packet Header and Packet Payload. The CRC is calculated with the nCRCPacket value initialized to zero.

2. Packet Payload Definition

Event Packet Type

The Event packet is used by the host system to send virtual events (such as Zoom, Source, Auto Adjust, etc.) to the target system. Packet payload size is 6 bytes.

Byte	Field Name	Field Value	Description
0-1	Virtual Event		Virtual Event ID as defined through Configurator
2-5	Parameter		Parameter that can be associated with the event.

. Table 5 Event Packet Type Format

The source code definition of the Message packet data structure is:

```
typedef struct
{
     WORD     eEvent;
     DWORD   dwParam;
} EVENT_MESSAGE;
```

This lets you send any event defined in Configurator to the system including all remote, IR, or special events

Operation Packet Type

The Operation packet is used by the host system to execute operations (such as Brightness, Contrast, Image Position, etc) in the target system. The Operation packet payload size is 25 bytes.

Byte	Field Name	Field Value	Description
0	Operation Type	1	OPERATION_SET
		2	OPERATION_GET
		3	OPERATION_INCREMENT
		4	OPERATION_DECREMENT
		5	OPERATION_EXECUTE
1-2	Operation		Operation ID as defined in Configurator
3-4	Is Avail		Operation is available
5-8	Operation Target		Used for Operation with Targets. These Targets are defined in configurator. For instance, op_BRIGHTNESS has a Target of either MAIN or PIP window..
9-12	Operation Value		Value of the Set on a set or the Value of the Get on a Return.

13-16	Operation Value of minimum.		The Minimum Value of the set for operation command.
17-20	Operation Value of maximum		The Maximum Value of the set for operation command.
21-24	Operation Value of Increment		The Increment Value of the set for operation command.

Table 6 Operation Packet Payload Format

The source code definition of the Operation packet data structure is:

```
typedef struct
{
     eOPERATION_TYPE   eOpType;
     WORD      eOperation;
     WORD      bisAvail;
     DWORD     dwTarget;
     DWORD     dwValue;
     DWORD     lmMin;
     DWORD     lmMax;
     DWORD     lmInc;
} OPERATION_MESSAGE;
```

This lets the user directly perform logical operations such as “Set Contrast = 80”.

3. Send Command

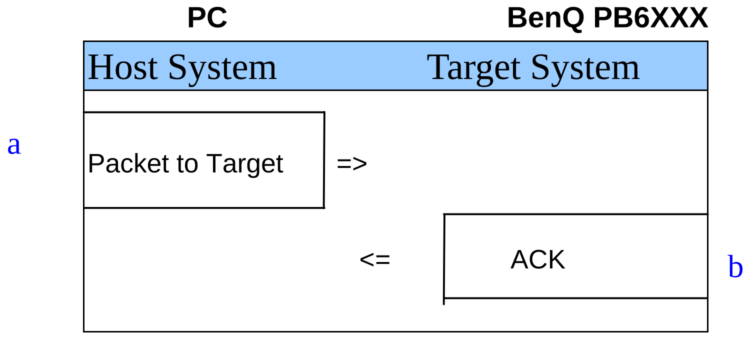


Figure 4

a. The structure of Command (EX. input select) send to Target (BenQ PB6XXX) like as below (Table 7)

Packet Header	Byte0	0xBE	Magic Number
	Byte1	0xEF	
	Byte2	0x02	Packet Type
	Byte3	0x06	Packet size (Low)
	Byte4	0x00	Packet size (High)
	Byte5	0x80	CRC (Low)
	Byte6	0xC7	CRC (High)
Packet Payload	Byte7	0xC9	Virtual Event ID
	Byte8	0x00	
	Byte9	0x00	Parameter
	Byte10	0x00	
	Byte11	0x00	
	Byte12	0x00	

Table 7

b. Target return to Host (PC) Ack like as below Table 8

Ack	Byte0	0x06	ACK

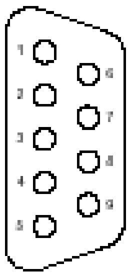
Table 8

C. Serial Communication Cable and Parameters

For external serial communication from a computer to BenQ projector, BenQ recommends manfactures use RS-232 communations over a straight through serial cable a 9 pin female D-sub9 connector.

The standard D-sub9 connector on the computer is a male connector, and BenQ projector, too. The wiring between the computer and BenQ projector is a straight through cable. A 9 pin female to 9 pin female stright through cable is a very standard part and readily available in many lengths.

Female D-sub9 pinout numbering and definitions on both terminal :



Pin number	Name
2	Transmit
3	Receive
5	Ground

PW Serial uses the following default serial port settings:

. Baud Rate: 19200

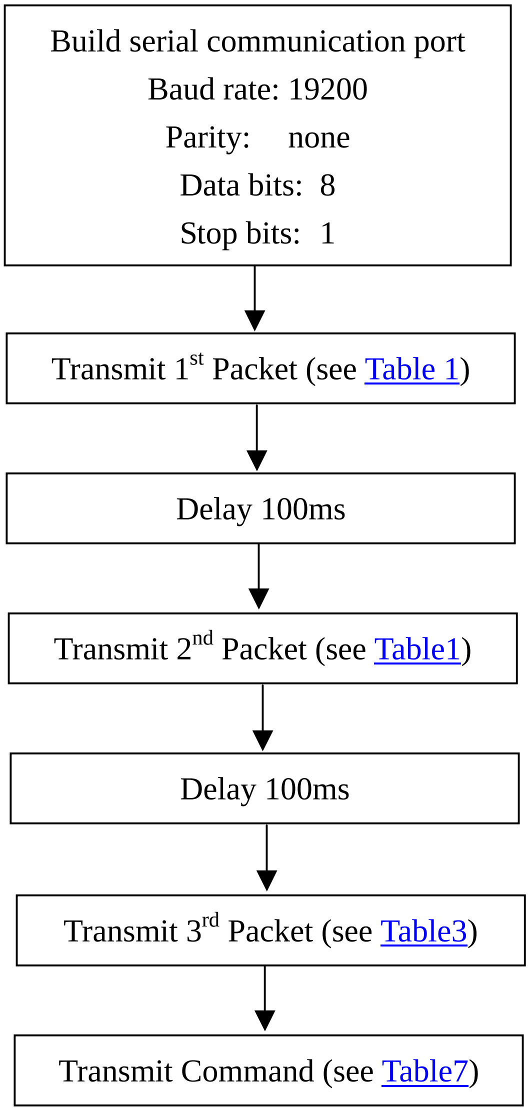
. Parity: none

. Data bits: 8

. Stop bits: 1

. Flow Control: none

D. Software Flow Chart



Command List

Event Packet Type command:

Command	Packet Header (7 bytes)	Packet Payload (6 bytes)
Power	BE EF 02 06 00 13 CE	AA 00 00 00 00 00
Auto	BE EF 02 06 00 F7 C8	8E 00 00 00 00 00
Input select	BE EF 02 06 00 C4 C8	8D 00 00 00 00 00
Menu	BE EF 02 06 00 26 C9	8F 00 00 00 00 00
Exit	BE EF 02 06 00 FE CA	97 00 00 00 00 00
Zoom +	BE EF 02 06 00 AD CD	B4 00 00 00 00 00
Zoom -	BE EF 02 06 00 7C CC	B5 00 00 00 00 00
PIP Source	BE EF 02 06 00 37 C6	CE 00 00 00 00 00
Freeze	BE EF 02 06 00 46 CE	AF 00 00 00 00 00
Ratio	BE EF 02 06 00 04 C6	CD 00 00 00 00 00
Force PC	BE EF 02 06 00 AE C6	C7 00 00 00 00 00
Force Video	BE EF 02 06 00 51 C6	C8 00 00 00 00 00
Force S-Video	BE EF 02 06 00 80 C7	C9 00 00 00 00 00
Force YPbPr	BE EF 02 06 00 B3 C7	CA 00 00 00 00 00
RS232 Power ON	BE EF 02 06 00 3E C4	D7 00 00 00 00 00
RS232 Power OFF	BE EF 02 06 00 C1 C4	D8 00 00 00 00 00
Blank	BE EF 02 06 00 1A CC	B3 00 00 00 00 00

Operation Packet Type command

PC Picture Controls

Command	Packet Header (7 bytes)	Packet Payload (25 bytes)
Brightness +	BE EF 03 19 00 44 A0	03 C7 02 CC CC 00 00 00 00 CC×16
Brightness -	BE EF 03 19 00 2A 0A	04 C7 02 CC CC 00 00 00 00 CC×16
Contrast +	BE EF 03 19 00 2E 19	03 C5 02 CC CC 00 00 00 00 CC×16
Contrast -	BE EF 03 19 00 40 B3	04 C5 02 CC CC 00 00 00 00 CC×16

YPbPr Picture Controls

Command	Packet Header (7 bytes)	Packet Payload (25 bytes)
Brightness +	BE EF 03 19 00 7B 14	03 D9 02 CC CC FF FF FF FF CC×16
Brightness -	BE EF 03 19 00 15 BE	04 D9 02 CC CC FF FF FF FF CC×16
Contrast +	BE EF 03 19 00 FA 6A	03 F1 02 CC CC FF FF FF FF CC×16
Contrast -	BE EF 03 19 00 94 C0	04 F1 02 CC CC FF FF FF FF CC×16

S-Video / Composite Video Picture Controls

Command	Packet Header (7 bytes)	Packet Payload (25 bytes)
Brightness +	BE EF 03 19 00 E9 18	03 35 02 CC CC 00 00 00 00 CC x16
Brightness -	BE EF 03 19 00 87 B2	04 35 02 CC CC 00 00 00 00 CC x16
Contrast +	BE EF 03 19 00 16 FC	03 36 02 CC CC 00 00 00 00 CC x16
Contrast -	BE EF 03 19 00 78 56	04 36 02 CC CC 00 00 00 00 CC x16
Color +	BE EF 03 19 00 83 A1	03 37 02 CC CC 00 00 00 00 CC X16
Color -	BE EF 03 19 00 ED 0B	04 37 02 CC CC 00 00 00 00 CC x16
Tint +	BE EF 03 19 00 00 0F	03 4A 02 CC CC 00 00 00 00 CC x16
Tint -	BE EF 03 19 00 6E A5	04 4A 02 CC CC 00 00 00 00 CC x16
Sharpness +	BE EF 03 19 00 43 D0	03 38 02 CC CC 00 00 00 00 CC x16
Sharpness -	BE EF 03 19 00 2D 74	04 38 02 CC CC 00 00 00 00 CC x16

Misc Controls

Command	Packet Header (7 bytes)	Packet Payload (25 bytes)
Color Temp –50 (0)	BE EF 03 19 00 69 49	01 ED 02 CC CC 00 00 00 00 CE FF FF FF CC CC CC CC CC CC CC CC CC CC CC CC
0 (10)	BE EF 03 19 00 1C 89	01 ED 02 CC CC 00 00 00 00 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
50 (20)	BE EF 03 19 00 69 1C	01 ED 02 CC CC 00 00 00 00 32 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC

PIP Controls

PIP Size		
Off	BE EF 03 19 00 15 02	01 8C 02 CC CC 01 00 00 00 03 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Small	BE EF 03 19 00 E4 42	01 8C 02 CC CC 01 00 00 00 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Medium	BE EF 03 19 00 74 83	01 8C 02 CC CC 01 00 00 00 01 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Large	BE EF 03 19 00 85 C3	01 8C 02 CC CC 01 00 00 00 02 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
PIP Position		
Upper-Left	BE EF 03 19 00 1D 66	01 43 02 CC CC 01 00 00 00 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Upper-Center	BE EF 03 19 00 8D A7	01 43 02 CC CC 01 00 00 00 01 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Upper-right	BE EF 03 19 00 7C E7	01 43 02 CC CC 01 00 00 00 02 00 00 00

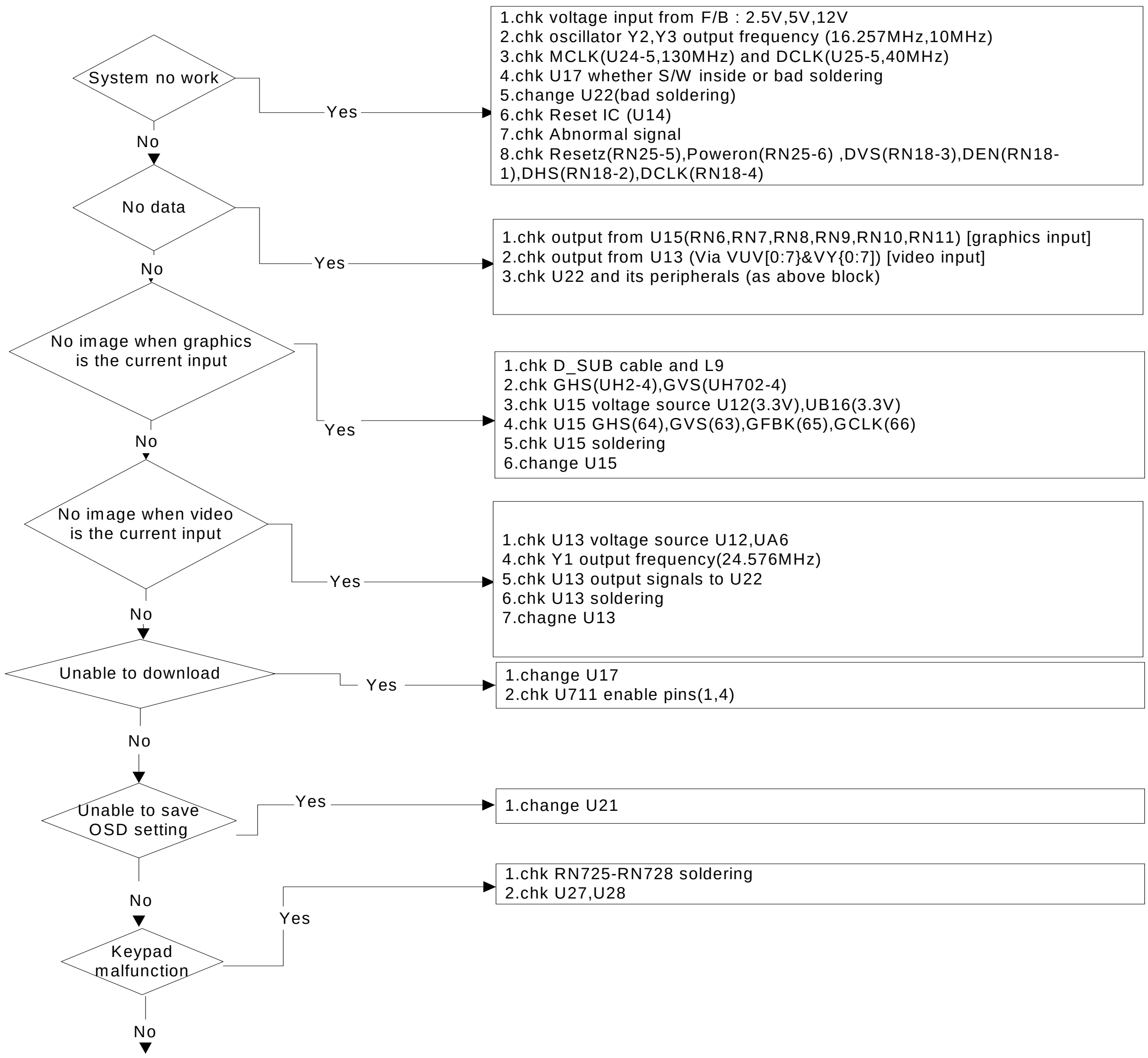
		CC CC CC CC CC CC CC CC CC CC CC CC
Mid-Left	BE EF 03 19 00 EC 26	01 43 02 CC CC 01 00 00 00 03 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Mid-Center	BE EF 03 19 00 DE 64	01 43 02 CC CC 01 00 00 00 04 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Mid-Right	BE EF 03 19 00 4E A5	01 43 02 CC CC 01 00 00 00 05 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Lower-Left	BE EF 03 19 00 BF E5	01 43 02 CC CC 01 00 00 00 06 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Lower-Center	BE EF 03 19 00 2F 24	01 43 02 CC CC 01 00 00 00 07 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Lower-Right	BE EF 03 19 00 DB 61	01 43 02 CC CC 01 00 00 00 08 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
PIP Source		
S-Video	BE EF 03 19 00 E8 36	01 DA 02 CC CC 01 00 00 00 03 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Video	BE EF 03 19 00 DA 74	01 DA 02 CC CC 01 00 00 00 04 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
PIP Brightness -50 (48)	BE EF 03 19 00 FE 0B	01 35 02 CC CC 01 00 00 00 CE FF FF FF CC CC CC CC CC CC CC CC CC CC CC CC
0 (126)	BE EF 03 19 00 8B CB	01 35 02 CC CC 01 00 00 00 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
50 (204)	BE EF 03 19 00 FE 5E	01 35 02 CC CC 01 00 00 00 32 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
PIP Contrast -50 (58)	BE EF 03 19 00 01 EF	01 36 02 CC CC 01 00 00 00 CE FF FF FF CC CC CC CC CC CC CC CC CC CC CC CC
0 (131)	BE EF 03 19 00 74 2F	01 36 02 CC CC 01 00 00 00 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
50 (204)	BE EF 03 19 00 01 BA	01 36 02 CC CC 01 00 00 00 32 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
PIP Color –50 (129)	BE EF 03 19 00 94 B2	01 37 02 CC CC 01 00 00 00 CE FF FF FF CC CC CC CC CC CC CC CC CC CC CC CC
0 (157)	BE EF 03 19 00 E1 72	01 37 02 CC CC 01 00 00 00 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
-50 (185)	BE EF 03 19 00 94 E7	01 37 02 CC CC 01 00 00 00 32 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
PIP Tint -50 (0)	BE EF 03 19 00 17 1C	01 4A 02 CC CC 01 00 00 00 CE FF FF FF CC CC CC CC CC CC CC CC CC CC CC CC
0 (128)	BE EF 03 19 00 62 DC	01 4A 02 CC CC 01 00 00 00 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
50 (255)	BE EF 03 19 00 17 49	01 4A 02 CC CC 01 00 00 00 32 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC

9. Trouble Shooting Guide

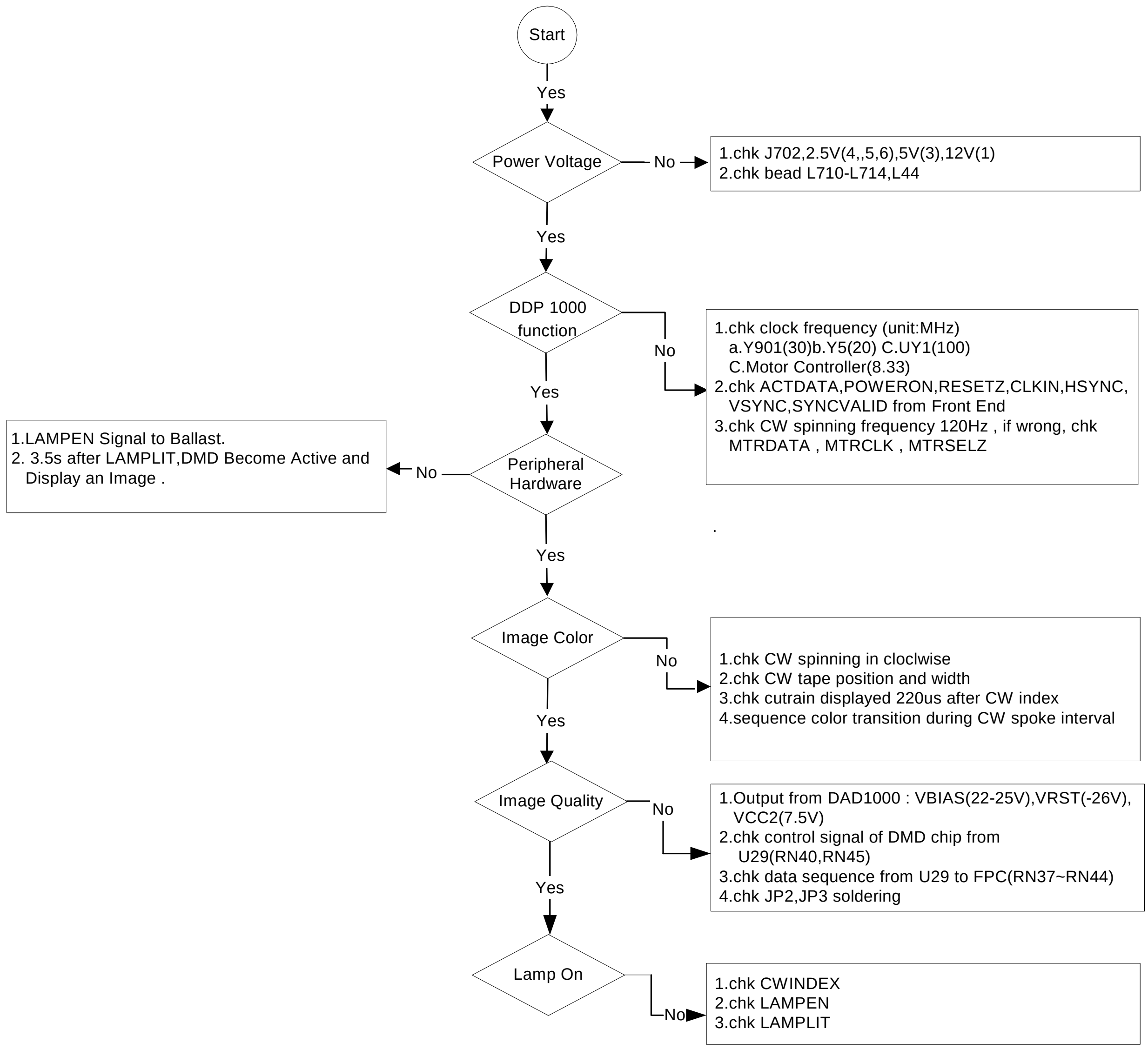
Optical Engine

No.	Item	Trouble Shooting Guide
1	Brightness	1. Change lamp 2. Check overfill size: If overfill too large, re-install SL and AL to ensure correct position
2	Uniformity	1. If Uniformity is within 3% of spec: Change lamp 2. Check FM installation 3. Check overfill size: If overfill too small, re-install SL and AL to ensure correct position
3	FOFO Contrast	1. Clean DMD 2. Clean PL
4	ANSI Contrast	1. Clean PL 2. Clean DMD 3. Change PL
5	Color	Check CW 50% point. Replace CW if necessary
6	Color Uniformity	Change CM
7	Blue Edge	1. Readjust LP: Make sure the LP end is touching with DMD_HSG Datum 2. Check LP: If LP is crushed, replace with new LP
8	Blue/Purple Border	1. re-install SL and AL to ensure correct position 2. Check FM installation
9	Focus	1. Change Projection Lens 2. Put shim metal between upper side of DMD and DMD datum
10	Dust	Clean DMD
11	Horizontal/Vertical Strips	1. Check connector between FPC and M/B 2. Re-install DMD with FPC 3. Check if any pin of C-Spring is missing or damaged 4. Change new FPC/C-Spring 5. Change new DMD
12	Pixel Fail	Change new DMD

Main board

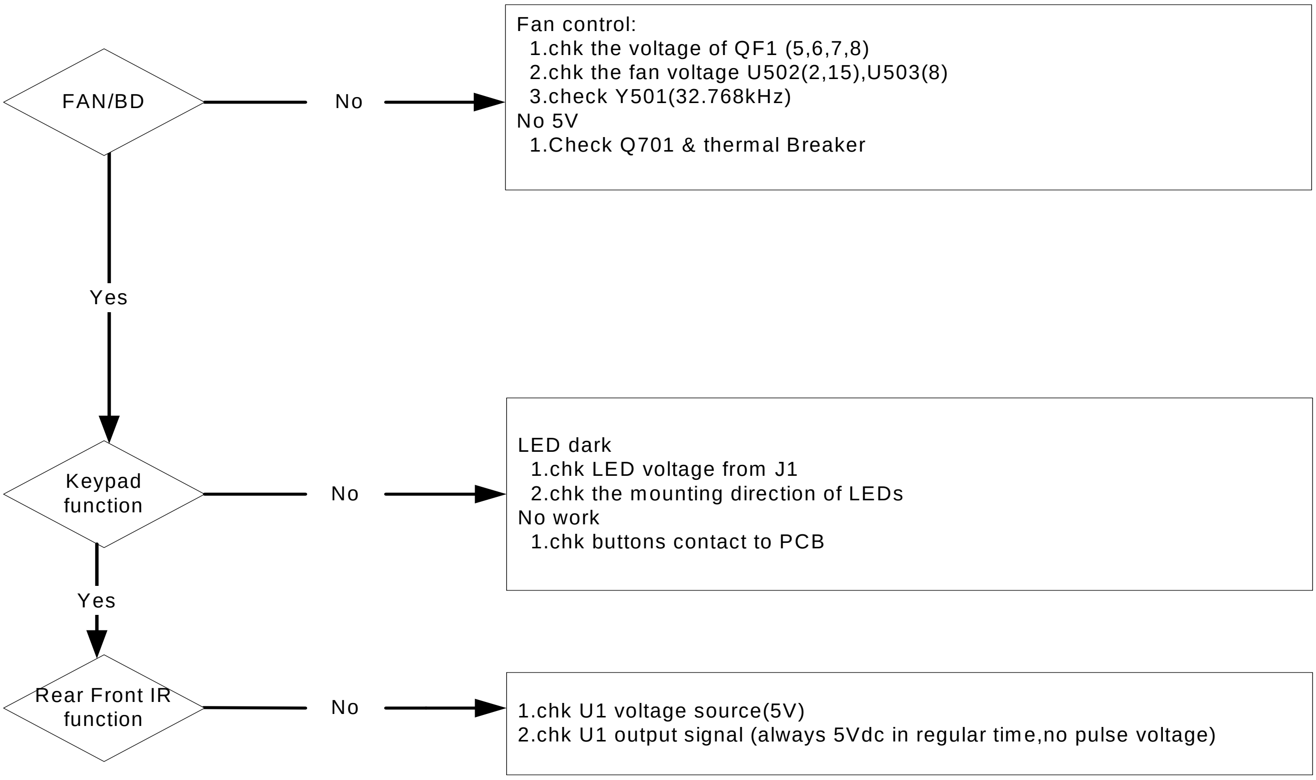

System no work
Yes
1.chk voltage input from F/B : 2.5V,5V,12V
2.chk oscillator Y2,Y3 output frequency (16.257MHz,10MHz)
3.chk MCLK(U24-5,130MHz) and DCLK(U25-5,40MHz)
4.chk U17 whether S/W inside or bad soldering
5.change U22(bad soldering)
6.chk Reset IC (U14)
7.chk Abnormal signal
8.chk Resetz(RN25-5),Poweron(RN25-6) ,DVS(RN18-3),DEN(RN18-1),DHS(RN18-2),DCLK(RN18-4)
No
No data
Yes
1.chk output from U15(RN6,RN7,RN8,RN9,RN10,RN11) [graphics input]
2.chk output from U13 (Via VUV[0:7}&VY{0:7]) [video input]
3.chk U22 and its peripherals (as above block)
No
No image when graphics is the current input
Yes
1.chk D_SUB cable and L9
2.chk GHS(UH2-4),GVS(UH702-4)
3.chk U15 voltage source U12(3.3V),UB16(3.3V)
4.chk U15 GHS(64),GVS(63),GFBK(65),GCLK(66)
5.chk U15 soldering
6.change U15
No
No image when video is the current input
Yes
1.chk U13 voltage source U12,UA6
4.chk Y1 output frequency(24.576MHz)
5.chk U13 output signals to U22
6.chk U13 soldering
7.chagne U13
No
Unable to download
Yes
1.change U17
2.chk U711 enable pins(1,4)
No
Unable to save OSD setting
Yes
1.change U21
No
Keypad malfunction
Yes
1.chk RN725-RN728 soldering
2.chk U27,U28
No

DMD Driver

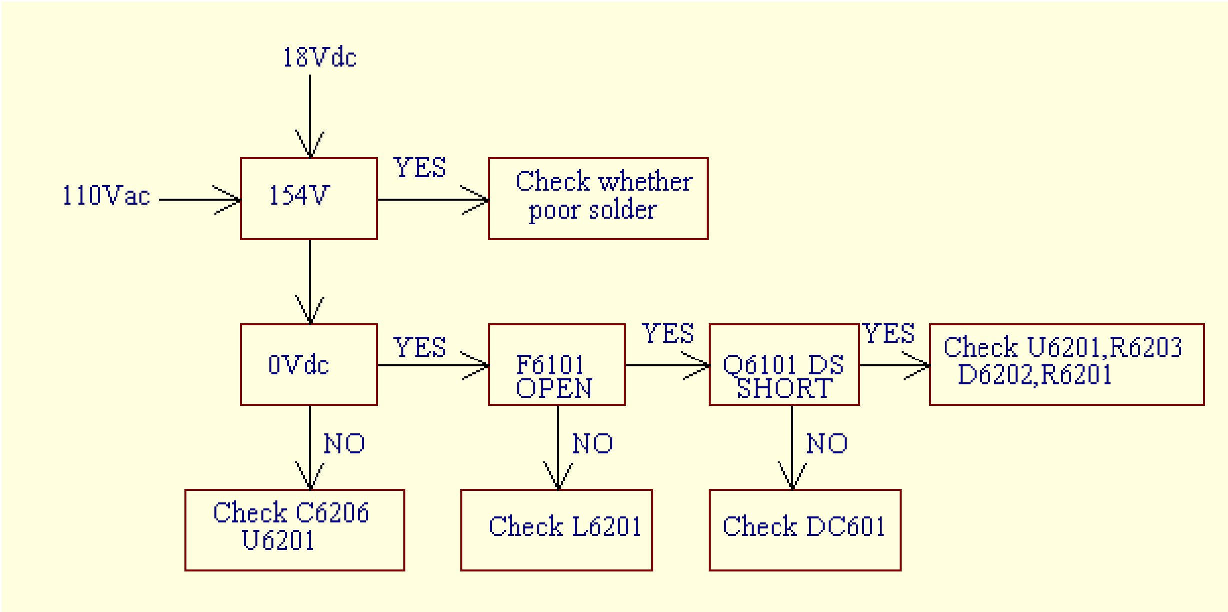


Start
Yes
Power Voltage
No
1.chk J702,2.5V(4,,5,6),5V(3),12V(1)
2.chk bead L710-L714,L44
Yes
DDP 1000 function
No
1.chk clock frequency (unit:MHz)
a.Y901(30)b.Y5(20) C.UY1(100)
C.Motor Controller(8.33)
2.chk ACTDATA,POWERON,RESETZ,CLKIN,HSYNC,
VSYNC,SYNCVALID from Front End
3.chk CW spinning frequency 120Hz , if wrong, chk
MTRDATA , MTRCLK , MTRSELZ
Yes
Peripheral Hardware
No
1.LAMPEN Signal to Ballast.
2. 3.5s after LAMPLIT,DMD Become Active and
Display an Image .
Yes
Image Color
No
1.chk CW spinning in cloclwise
2.chk CW tape position and width
3.chk cutrain displayed 220us after CW index
4.sequence color transition during CW spoke interval
Yes
Image Quality
No
1.Output from DAD1000 : VBIAS(22-25V),VRST(-26V),
VCC2(7.5V)
2.chk control signal of DMD chip from
U29(RN40,RN45)
3.chk data sequence from U29 to FPC(RN37~RN44)
4.chk JP2,JP3 soldering
Yes
Lamp On
No
1.chk CWINDEX
2.chk LAMPEN
3.chk LAMPLIT

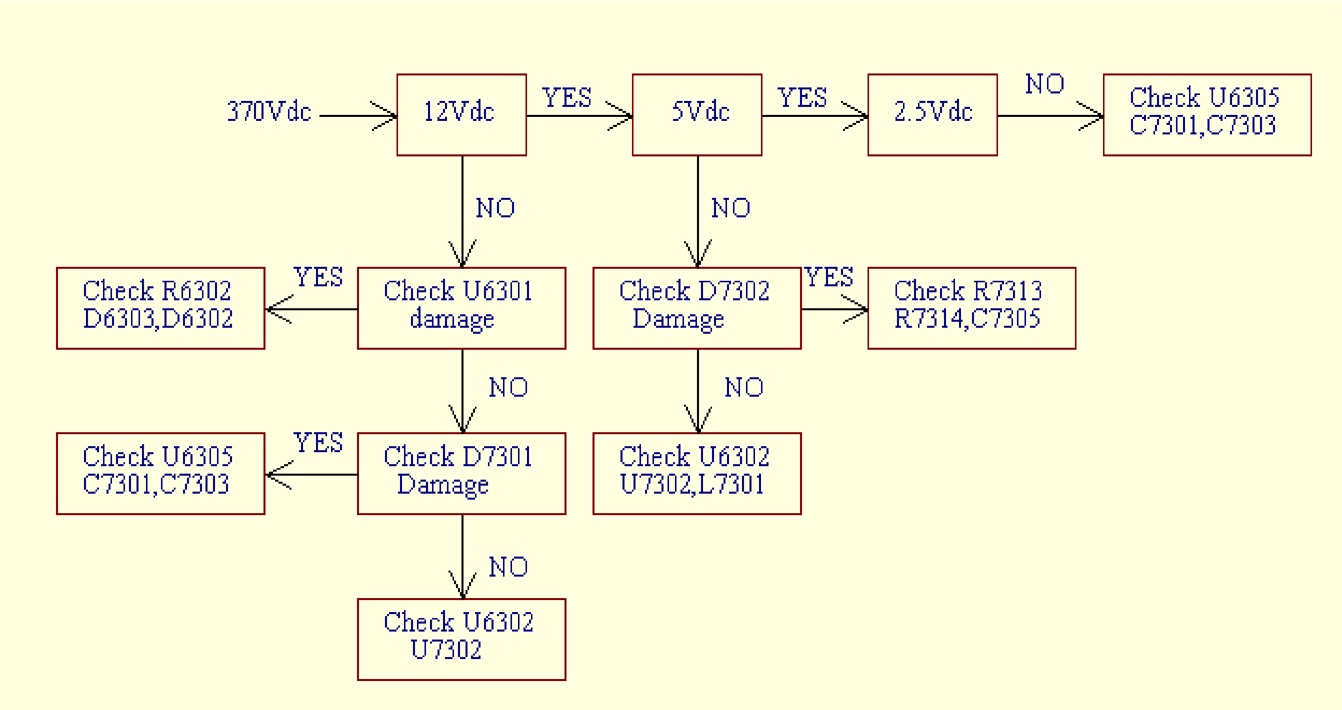
Smaller boards



PFC BOARD



DC-DC BOARD



Appendix: Abbreviations

PWR	Power supply module
M/B	Main board
F/C	Front End Circuit
D/B	DMD Driver Circuit
FPC	FPC transmission board
K/B	Keypad board
R/B	Rear IR board
CW	Color wheel
S/W	Software
S/B	Sensor board
F/B	Fan board
AL	Aspherical Lens
SL	Spherical Lens
FG	Front Glass
LP	Light Pipe
FM	Fold Mirror
CM	Concave Mirror
PL	Projection Lens

10. CUSTOMER ACCEPTANCE CRITERIA

CONTENT

PART Ⅰ INSPECTION CRITERIA

1.0 SCOPE

This document establishes the general workmanship standards and functional acceptance criteria for PROJECTOR produced by BENQ.

2.0 PURPOSE

The purpose of this publication is to define a procedure for inspection of the PROJECTOR by means of a customer acceptance test, the method of evaluation of defects and rules for specifying acceptance levels.

3.0 APPLICATION

The "Customer Acceptance Criteria" is applicable to the inspection of the PROJECTOR, completely packed and ready for dispatch to customers. Unless otherwise specified, the customer acceptance inspection should be conducted at manufacturer's site.

4.0 DEFINITION

The "Customer Acceptance Criteria" is the document defining the process of examining, testing or otherwise comparing the product with a given set of specified technical, esthetic and workmanship requirements leading to an evaluation of the "degree of fitness for use", including possible personal injury or property damage for the use of the product.

5.0 CLASSIFICATION OF DEFECTS

The defects are grouped into the following classes:

5.1 Critical defect

A critical defect is a defect which judgment and experience indicate that there is likely to result in hazardous or unsafe conditions for individuals using product.

5.2 Major defect

A major defect is a defect, other than critical one, is likely to result in failure, or to reduce materially the usability of the product for its intended purpose.

5.3 Minor defect

A minor defect is a defect that is not likely to reduce materially the usability of its intended purpose, or is a departure from established standards having little bearing on the effective use of operation of the product.

6.0 CLASSIFICATION OF DEFECTIVES

A defective is a product which contains one or more defects. The defective will be classified into following classes:

6.1 Critical defective

A critical defective contains one or more critical defects and may also contain major and/or minor defects.

6.2 Major defective

A major defective contains one or more major defects and may also contain minor defects but contains no critical defect.

6.3 Minor defective

A minor defective contains one or more minor defects but contains no critical and major defects.

7.0 INSPECTION STANDARD

Unless otherwise specified, the inspection standard will be defined by MIL-STD-105E, NORMAL INSPECTION LEVEL Ⅱ, SINGLE SAMPLING PLAN.

7.1 Acceptance Quality Level

7.1.1 Critical Defect:

When a critical defect is found, this must be reported immediately upon detection, the lot or batch shall be rejected and further shipments shall be held up pending instructions from the responsible person in relevant department.

7.1.2 Under normal sampling

Critical	Defective :	0% AQL
Major	Defective :	0.65% AQL
Minor	Defective :	2.5% AQL

7.1.3 Under special sampling

Critical	Defective :	0% AQL
Major	Defective :	1.0% AQL
Minor	Defective :	4.0% AQL

8.0 GENERAL RULES

8.1 The inspection must be carried out by trained inspectors who have good knowledge about the product.

8.2 The inspection must be based upon the documents concerning the completely assembled and packed product.

8.3 When more defects appear with the same unit only the most serious defect have to be taken into account.

8.4 Defects found in accessory packed with the product such as Cable, Connector, Manual, CD and the like, and being inspected as a part of the complete product, must be included in the evaluation.

8.5 The evaluation must be within the limits of the product specification and, for not specified characteristics, refer to the sample machine or the judgment of BENQ QA Engineer. But any kind of proposals or judgments must be reasonable and acceptable by both sides.

8.6 Faults must be able to be repeatedly demonstrated.

9.0 TEST CONDITIONS

Unless other prescription, the test conditions are as followings:

Nominal voltage : refer to operation manual
Environmental illumination variable from 400 to 700 lux
Temperature :

Operating	:	**0~ 35 ℃**
Storage	:	**-10~ 60 ℃**

Humidity:

Operating	:	**10 ~ 90 % RH**
Storage	:	**10 ~ 90 % RH**

Altitude:

Operating : 0 ~ 6000 ft above sea level,

10.0 TEST EQUIPMENTS

10.1 Pentium with 32MB of system memory , 64M RAM and above are recommended.

10.2 Win98 or later Operation Environment

10.3 VGA or any Windows compatible display with a resolution of at least 640x480 pixels, and set to high color or true color mode.

10.4 Quantum card/Chroma & Test pattern files

10.5 Dark room

10.6 29 points optical measure equipment

10.7 Pattern generators

10.8 DVD player

10.9 Mouse

PART Ⅰ INSPECTION CRITERIA

■ Packing, marking and accessory

△ Inner packing material broken.	minor
△ Carton damaged with hole over 1.5 cm in diameter.	minor
△ Carton crashed with dent over 5 cm in diameter.	minor
△ Printing of carton is illegible.	minor
△ Broken packing bag	minor
☆ Spec. label's serial number not the same as carton label's.	Major
☆ Packing model not the same as carton.	Major
☆ Marking missing/wrong.	Major
☆ Accessory shortage/wrong.	Major
☆ Projector missing(found none in carton).	Major
☆ Label on box missing or damaged	Major
☆ Strange objects in the box	Major

■ Appearance on visible parts

△ Poor printing on panel sticker(segment broken, illegible).	minor
△ Damage or deviation when viewed at a distance of 50 cm.	minor
△ Cover/case is dirty(removable).	minor
△ Cover/case exists black spot(irremovable).	minor
△ Cover/case is scratched. (Note 1)	minor
△ Spec Label reverse, rugged, illegible printing.	minor
△ LED sink over 1 mm.	minor
☆ Label/screws shortage or missing.	Major
☆ Wrong logo of panel sticker.	Major
☆ Wrong spec. label printing.	Major
☆ Label on product wrong or missing	Major

■ Installation

☆ Any accessory which are failed to meet the installation purpose	Major

■ Function

△ **Abnormal sound during projection(from 50 cm).** **minor**

☆ **LED won't light / No power / can't work.** **Major**

☆ **Other function test please refer to Note 2.**

■ Safety defect class

☆ **Any item which violates the approved safety standard.** **major**

★ **Electrical shock or smoke.** **Critical**

Note 1 : Please refer to attachment 1.

Note 2 : Please refer to attachment 2.

<u>Attachment 1</u> Scratch Acceptance

Any scratch which exceeds the maximum allowance is treated as a minor defect.

Black spot, Soil, Bubble inspective standard

	Spec. (mm^2)	A side	B side	C side	備註
Black Soil Bubble	0.05 mm^2 以下 between 2 cm	Accept	Accept	Accept	1. A、B、C side defineted as Diagram - A1 2.. LOGO 周邊 2 cm 內不可有 0.05m m^2以上之斑點 (0.05m m^2 以內斑點不計)
	0.05 ~0.1mm^2 between 5 cm	4	5	6	
	0.1~0 5m m^2 between 5cm	3	4	5	
	0.2~0.3mm^2 between 10cm	2	3	4	

PS : Any kind of defect not seen from 45 cm(18 inches)(It's about an arm's length) with 15 seconds should not be a reject.

Any scratch which exceeds the maximum allowance is treated as a minor defect.

	Spec. (mm)	A side	B side	C side	Remake
Scratch Dent	W<0.1 L<1	1	2	3	1. The separation distance between defects must great than 10mm.
	W<0.1 L<2	0	1	2	
	W<0.1 L<3	0	0	1	

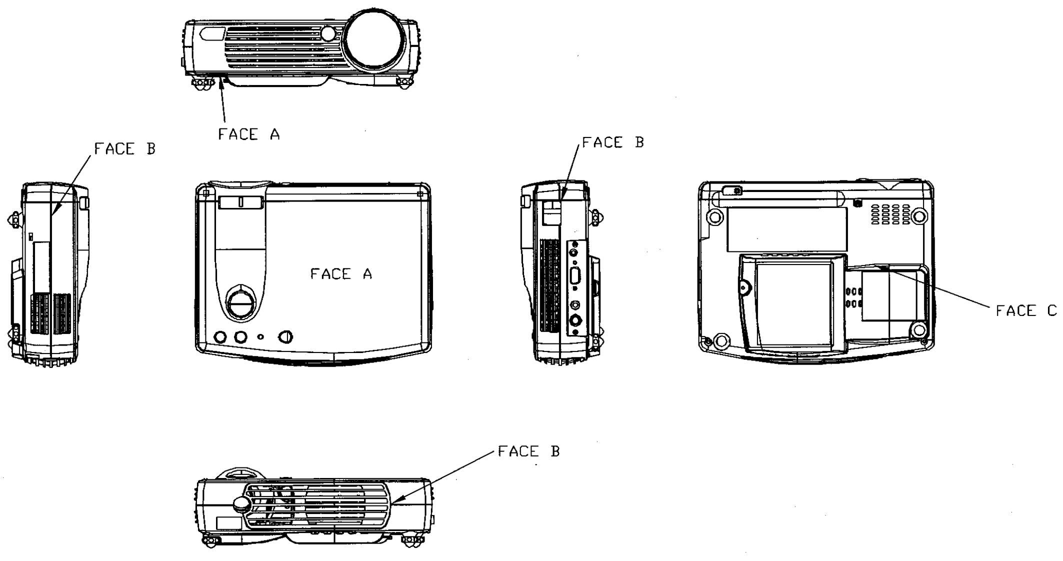


Diagram - A1   Definition of Projector's sides

Attachment 2 **Quality Specification of PB6100**

Following item's spec. will base on Engineering spec.

Item		Spec	Remarks
1. Brightness	Minimum	1120 lumens	major
2. Uniformity	Minimum	50 %	major
3. ANSI Contrast Ratio		150:1	major
4. FOFO contrast Ratio		700:1	major
5. Screen Size For Testing		60" at 2m	major
6 .Focus Range		1.5~6m	major
7. Keystone Distortion		<1.0%	major
8. Audible Noise Level	Typical	34dBA at 25°C	major
	Maximum	35dBA at 25°C	
9. Power Connector		IEC - 06	major
10. Throw Ratio		47" ±5% Diagonal at 2m	major
12. Power consumption		Typical 285W / Standby <15W	
13. Blue Border		<2 lux with 40" (diagonal) image size	
Purple Border		<4 lux with 40" (diagonal) image size	

14. Light Leakage In Active Area <1.5 lux within 47" (diagonal) image size
Light Leakage out of Active Area <5 lux between of 47" (diagonal) image size and 60" (diagonal) area

15. IR Receiver , IR Receiver X 2 (Front, Rear)

16. Check the remote control function whether it is correct

17. Check the DVD image whether it is correct

18.Color Temprature

1.8.1 White	.298±.040	.318±.040
1.8.2 Red	.627±.040	.369±.040
1.8.3 Green	.333±.040	.559±.040
1.8.4 Blue	.137±.040	.061±.040

19. Focus

1.9.1 for PROT lens	1.Pattern:⊠ pattern 2.Observation:2m to screen(wide only) 3.Criteria: 1.pattern uniform and clear-------->OK 2.If can't focus uniform and clear，switch to ⊠ pattern and focus uniform clear all over screen (central must clear than corner) Measure flare and defocus a.flare:R,G≦2.5 B≦3.5 b.defocus:≦2.5 (⊠ pattern: Chroma 84,flare and defocus pattern: chroma 34)
1.9.2 for AOCI lens(A.17) (A.19)	Flare : R <=4.5, G<=4.5, B<=4.5 Defocus: R < = 2.0, G < = 2.0, B < = 2.0

20.Lateral Color	Pattern(A.19)	Center of screen	All other area
	R-G	<1/2	<1
	G-B	<1/2	<1
	R-B	<2/3	<1

21. Compatibility			
21.1 PC	PC Compatible 640X400 → 1024X768, compressed 1280X1024; Composite-Sync; Sync-on-Green; Interlace Mode (8514A); Detailed Support Timing Specification refer to Appendix E.1		
	PC Frequency Limitation	H-Sync	24 ~ 88 KHz
		V-Sync	48 ~ 100 Hz
		Pixel Clock	140 MHz
21.2 Video	NTSC/ NTSC4.43/ PAL (Including PAL-M, PAL-N)/ SECAM/ PAL60/		
21.3 YP_bP_r	NTSC 480i/ 480p, PAL 576i/ 720p, HDTV 720p/1080i		

DMD Image Specification

1. SCOPE

This document specifies the image quality requirements applicable to the XGA RGBW Palmtop Configuration F Component Kit. The Component Kit provides the XGA RGBW Palmtop Projector with Digital Imaging functionality based on Digital Micromirror Device (DMD) technology.

2. Definitions

2.1 Blemish

A blemish is an obstruction, reflection, or refraction of light that is visible, but out of focus in the projected image under specified conditions of inspection (see Table 1). It is caused by a particle, scratch, or other artifact located in the image illumination path.

2.2 Dark pixel

A dark pixel is a single pixel or mirror that is stuck in the OFF position and is visibly darker than the surrounding mirrors.

2.3 Bright pixel

A single pixel or mirror that is stuck in the ON position and is visibly brighter than the surrounding mirrors.

2.4 Unstable pixel

A single pixel or mirror that does not operate in sequence with parameters loaded into memory. The unstable pixel appears to be flickering asynchronously with the image.

2.5 Adjacent

Two or more stuck pixels sharing a common border or common point , also referred to as a cluster .

2.6 Streaks

Artifact resulting from localized variation in mirror tilt angle relative to surrounding mirrors . They are similar in appearance to window scratches but appear at the mirror

Level . Streaks appear as faint diagonal or arcing patterns in the image.

2.7 Sea of Mirrors (SOM)

SOM is a rectangular array of off-state mirrors surrounding the active area.

2.8 Eyecatcher

A small localized light "spot" which haas high spatial frequency and high differential

Brightness. These are due to various DMD window or window aperture "defects" Including : digs , voids , particles and scratches.

2.9 Border Artifacts

All variations of these artifacts are acceptable under this image quality specification.

Border artifacts are a general category of image artifacts that may show up on screen in the area outside of the active array. Border artifacts include: Exposed Bond Wires , Exposed Metal 2 , and Reflective Edge.

2.9.1 Bond Wires

Bond Wires attach the die to the superstructure. If visible, they will appear as short light parallel lines outside of the Sea of Mirrors (SOM).

2.9.2 Exposed Metal 2 is due to a shift in positioning of either the die or the window aperture which may allow light to be reflected off of the layer of metal 2 that is below the super structure (mirrors). This defect is located at the outer edge of the SOM.

2.9.3 Reflective Edge

Reflective Edge is light that may reflect from the edge of the DMD"s window aperture onto the projection screen. It will appear as a thin diffuse line outside of the SOM.

2.10 Two Zone Blue 60 Screen

The Two Zone Blue 60 screen is used to test for major dark blemishes. Refer to Figure 1 for configuration. All areas of the screen are colored a Microsoft Paintbrush blue 60 (green and red set at 0 , blue set at 60).

NOTE : If linear degamma table being used in order to generate an equivalent blue level on the test screen image.

2.11 Two Zone Gray 10 Screen

The Two Zone Gray 10 screen is used to test for major light blemishes. Refer to Figure 1 for configuration. All areas of the screen are colored a Microsoft Paintbrush gray 10 (green , red , and blue set at 10).

NOTE : If linear degamma is not used then the Microsoft Paintbrush values must be adjusted to match the degamma table being used in order to generate an equivalent gray level on the test screen image.

3. ACCEPTANCE REQUIREMENTS

3.1 Conditions of Acceptance

All DMD image quality defects must be determined under the folloeing projected image test conditions :

a. Projector degamma shall be linear.
b. Projector error diffusion shall be “off “.
c. Projector brightness and contrast settings shall be set to nominal.
d. The diagonal size of the projected image shall be a minimum of 60 inches.
e. The projection screen shall be 1X gain.
f. The image shall be in focus during all Table 1 tests.
g. The projected image shall be inspected from an 8 feet minimum viewing distance.

3.2 Test Sequence

Tests shall be run in the sequence listed in Table 1

TABLE 1. Image Quality Specification

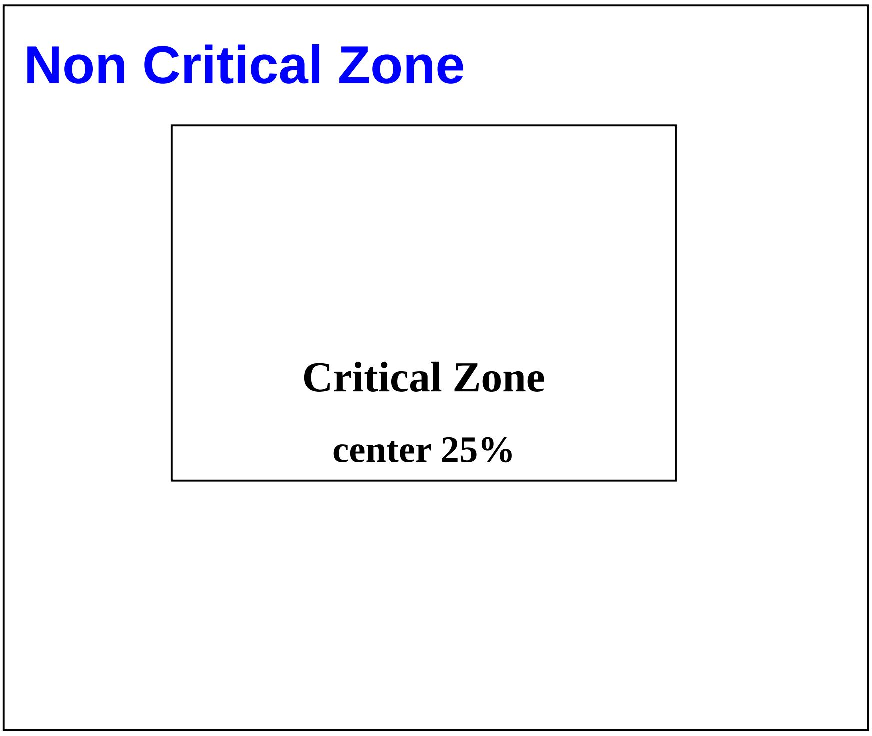
SEQ #	TEST	SCREEN	ACCEPTANCE CRITERIA
1	Major Dark Blemish	Two Zone Blue 60	1. No blemish will be darker than Microsoft Blue 60 in the Critical Zone 2. <=2 blemishes in the Non-Critical Zone 3. No blemish will be >1/2” long / diameter
2	Major Light Blemish	Two Zone Gray 10	1. No blemish will be lighter than Microsoft Gray 10 in the Critical Zone 2. <=2 blemishes in the Non Critical Zone 3. No blemish will be > 1/2” long / diameter
3	Eyecatcher	Gray 10	1. No eyecatcher will be lighter than Microsoft Gray 10
	Streaks	Blue 60 Gray 10 White	1. No streaks

	Projected Image	Any screen	1. No adjacent pixels. 2. No bright pixels (Active Area) 3. <= 1 bright pixel (SOM) 4. ≤ 4 dark pixels 5. ≤ 6 minor blemishes. 6. No DMD window aperture shadowing on the Active Area 7. No unstable pixels in Active Area

Notes :

1. Projected blemish numbers include the count for the shadow of the artifact in addition to the artifact itself, so that the count usually represents a single artifact on the window.
2. No blemish shall be more than 5 inches long or have a total area of more than 5 square inches on a 60 inch diagonal projected image. (<= 1/2 inch for Major Blemish tests)
3. During all Table 1 tests , projected images shall be inspected in accordance with the conditions of inspection specified in Section 3.
4. The rejection basis for all cosmetic DMD defects (scratches , nicks , particles) will be the projected image tests referenced in Table 1.
5. Any other image quality issue not specifically defined in this document shall be acceptable.
6. Black screens shall not be used as a basis for rejecting DMDs for image quality.

Figure 1. Major Blemish Two Zone Screen



Optical Measurement

1.Scope:

This document describes critical optical related test definitions and Instructions for data or video projectors. The other general terminologies are specified in ANSI IT7.228-1997.

2.General Requirements

1. The unit under test should be allowed to stabilize without further adjustment for a minimum of 5 minutes, at nominal ambient room temperature of 25°C, before making measurements.
2. Measurements shall take place in a light proof room, where the only source of illumination is the projector. Less than 1 lux of the light on the screen shall be from any source other than the projector.
3. All measurements shall be made on flat screens that do not provide any advantage to the performance of the unit
4. All measurements shall be made at standard color temperature setting, 100% white image (per ANSI IT7.228-1997), except where noted

3.Practical Requirements

1. When measuring contrast manually, operators should not wear white clothing since light reflected from white clothing can influence the measurement.
2. Unless otherwise specified, the projection lens is set in the widest zoom position since zoom function can influence the measurement.
3. Measurement should be performed with Minolta Chromameter, Model CL-100, or equivalent.

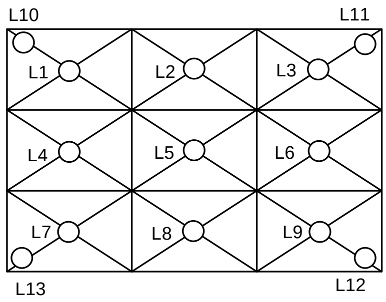
A1. ANSI BRIGHTNESS

ANSI Lumens = (L1+L2+L3+L4+L5+L6+L7+L8+L9)/9 (lux) x A(m^2)

A (Area) = W * H (m^2)

W: width of projected image (m)

H: height of projected image (m)



Note: L10, L11, L12, L13 are located at 10% of the distance from corner itself to L5

A2. BRIGHTNESS UNIFORMITY

Brightness Uniformity = Minimum (L10,L11,L12,L13)/ Average (L1,L2,L3,L4,L5,L6,L7,L8,L9)

A3. JBMA UNIFORMITY

JBMA Uniformity = Average (L1,L3,L7,L9)/ L5

A4. ANSI CONTRAST

ANSI Contrast = Average lux value of the white rectangles/Average lux value of the black rectangles

Contrast Ratio shall be determined from illuminance values obtained from a black-and-white "chessboard" pattern consisting of 16 equal rectangles. The white rectangles shall be at 100% gray and the black rectangles at 0% gray. Illuminance measurements shall be made at the center of each of the rectangles.

A5. FOFO CONTRAST

FOFO Contrast = Lux value at the center of a solid white screen/the lux value at the center of a solid black screen

A6. JBMA CONTRAST

JBMA Contrast = Average (L1,L2,L3,L4,L5,L6,L7,L8,L9) under solid white / Average (L1,L2,L3,L4,L5,L6,L7,L8,L9) under solid black

A7. LIGHT LEAKAGE

Leakage = The maximum light leakage under a solid black pattern in or outside of the projected image

A8. IMAGE DISTORTION

Keystone = (W2-W1)/ (W1+W2) x 100%

Vertical TV dist = (H1+H2-2xH3)/2H2 x100%

Horizontal TV dist = (W1+W2-2xW3)/2W1 x100%

W1: image width at image bottom

W2: image width at image top

W3: image width at the half image height.

H1: image height at image left

H2: image height at image right

H3: image height at half image

Note:

1. Keystone and Vertical TV Distortion are recommended for Front Projection Display
2. Vertical and Horizontal TV Distortion are recommended for Rear Projection Display

A9. THROW RATIO

Throw ratio = projection distance / the width of the projected image

A10. ZOOM RATIO

Zoom ratio = maximum / minimum image diagonal size at a fixed projection distance

A11. FOCUS RANGE

The minimum/maximum focus distance is the minimum/maximum projection distance (The distance between the outermost element of projection lens and screen), expressed in meter, at which the image is still at its acceptable focus level.(acceptable focus level is specified by FOCUS LIMIT SAMPLE approved by customer)

A12. COLOR

Color is expressed as (x, y) in 1931CIE chromaticity values

Note: Color is measured at the center of the screen that is entirely the measured color under default brightness and contrast settings.

A13. ANSI COLOR

ANSI Color is expressed as (u, v) in 1976 CIE chromaticity values

Note: Color is measured at the center of the screen that is entirely the measured color under default brightness and contrast settings.

A14. COLOR UNIFORMITY

Color Uniformity is the maximum color difference (△x, △y) between any two points out of L1~L13

A15. ANSI COLOR UNIFORMITY

ANSI Color Uniformity: △u'v'= [(u'1-u'0)^2+(v'1-v'0)^2]^1/2

(u'0,v'0): the average color of L1~L13

(u'1,v'1): the spot with maximum deviation from (u'0,v'0)

A16. PROJECTION OFFSET

Projection Offset= Image height above projection lens optical axis / Total image height x 100%

Note: Optical engine should be kept horizontal attitude

A17. Customer Defined Focus

i. Focus test procedure (Wide only)

a. Pattern: Cross Hatch (Refer to A27 for all related test patterns)

b. Steps:

Step 1: Get best focus at Screen Center with "Phon Pattern"

Step 2: Check "Cross Hatch" at 60", Wide position.

Step 3: Observe R, G, B color separately and check "Center and 4 corners of screen" for "Defocus" and "Flare" (Check line only, no check point)

Step 4: Good ("Defocus" << A, "Flare" << B)→ No more check needed

Step 5: Limit→ Check "Defocus" (60" <A pixels)

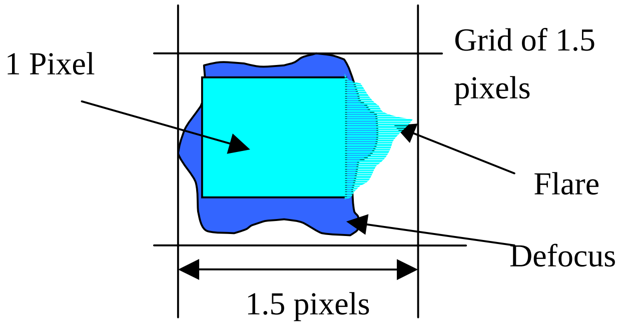
Check "Flare" (60" <B pixels)

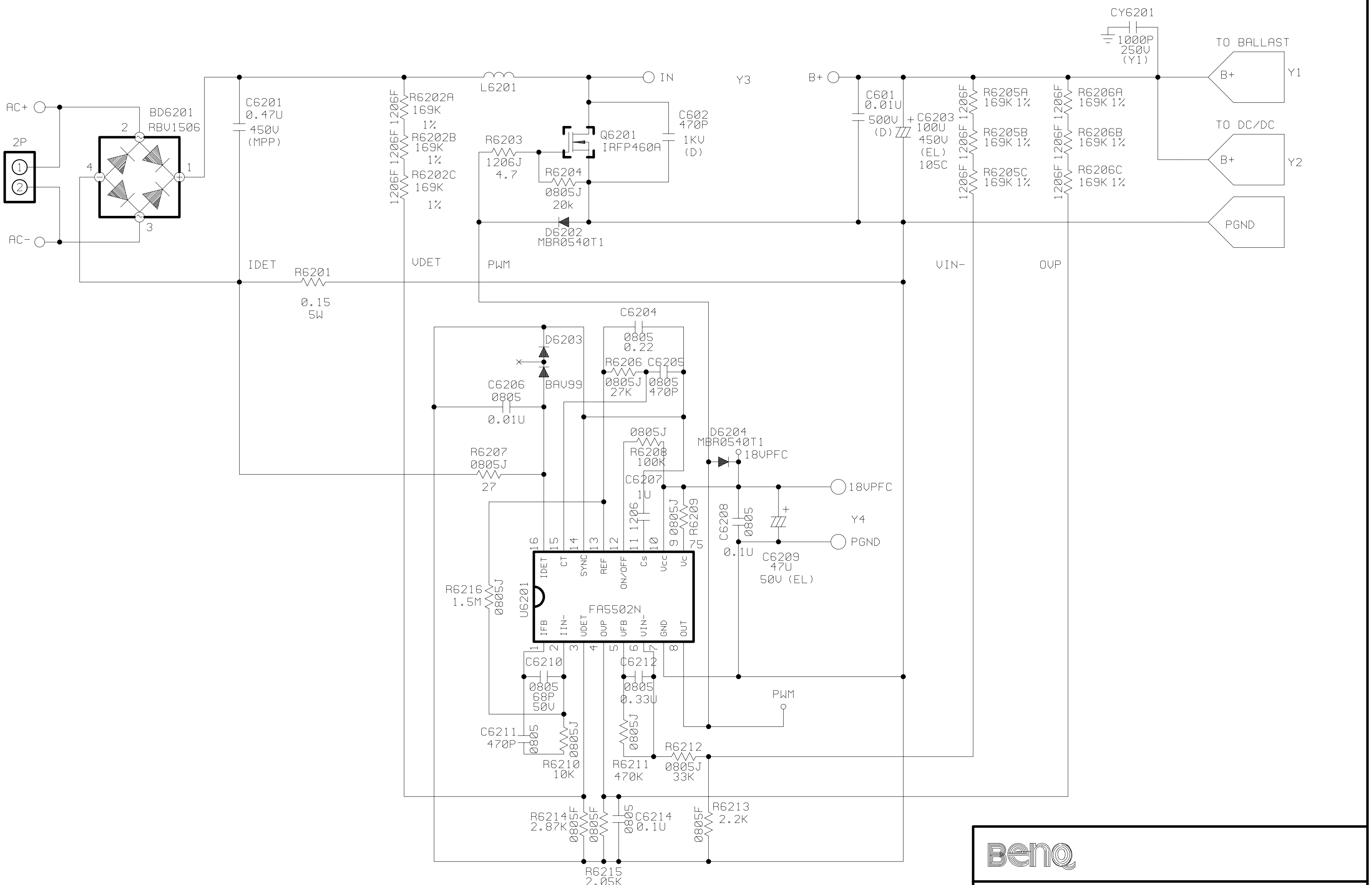
Step 6: Worst unit of the day→ Check "Letter pattern" (Screen to Observer 6m, Wide and Tele same spec) with:

"Defocus" < C pixels

"Flare" < D pixels

ii. Criteria: Measure the flare size with agreed "Grid" paper and as follows:

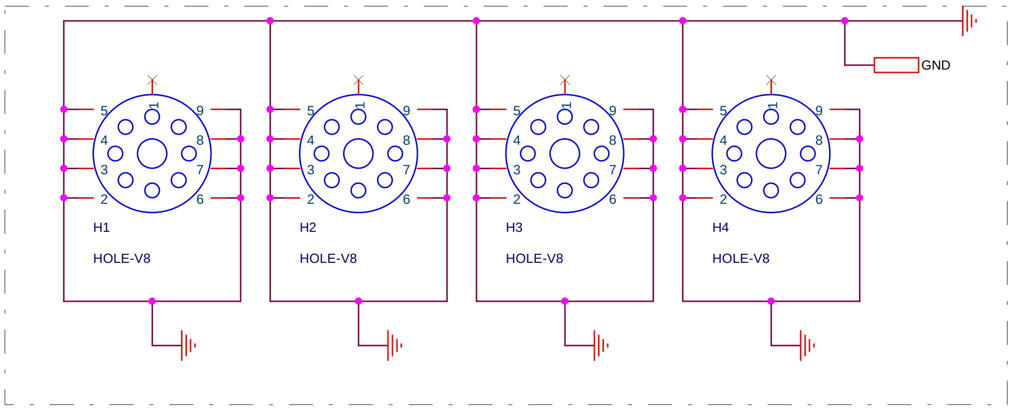


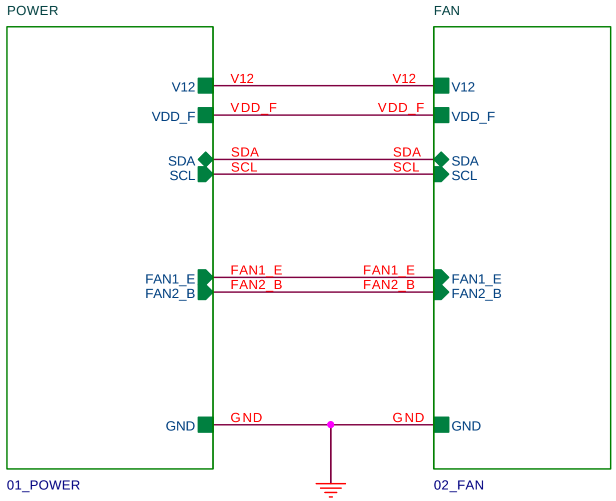


BenQ			
PB6100 PFC BD SCHEMATICS			
SIZE A4	J8611S01.SCH	Project Code. 99.J8677.001	REV. 0
DATE : 8/5/2003		Sheet 1 OF 1	
Doc.No. 99.J8677.B12-C3-304-001			
Prepared By	Reviewed By	Approved By	
ANGEL HU 8/5/2003	KEN JA CHEN 8/5/2003	JACK CHEN 8/5/2003	

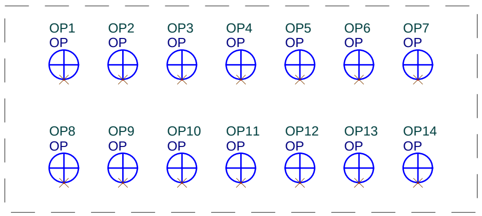
NOTES:
1. Resistor values are in ohm, K=1,000 ohm, M=1,000,000 ohm
2. All resistors are 1/8 watt, 5% except where otherwise indicated
3. (ground symbols) Represents PCB common ground.

Screw Holes



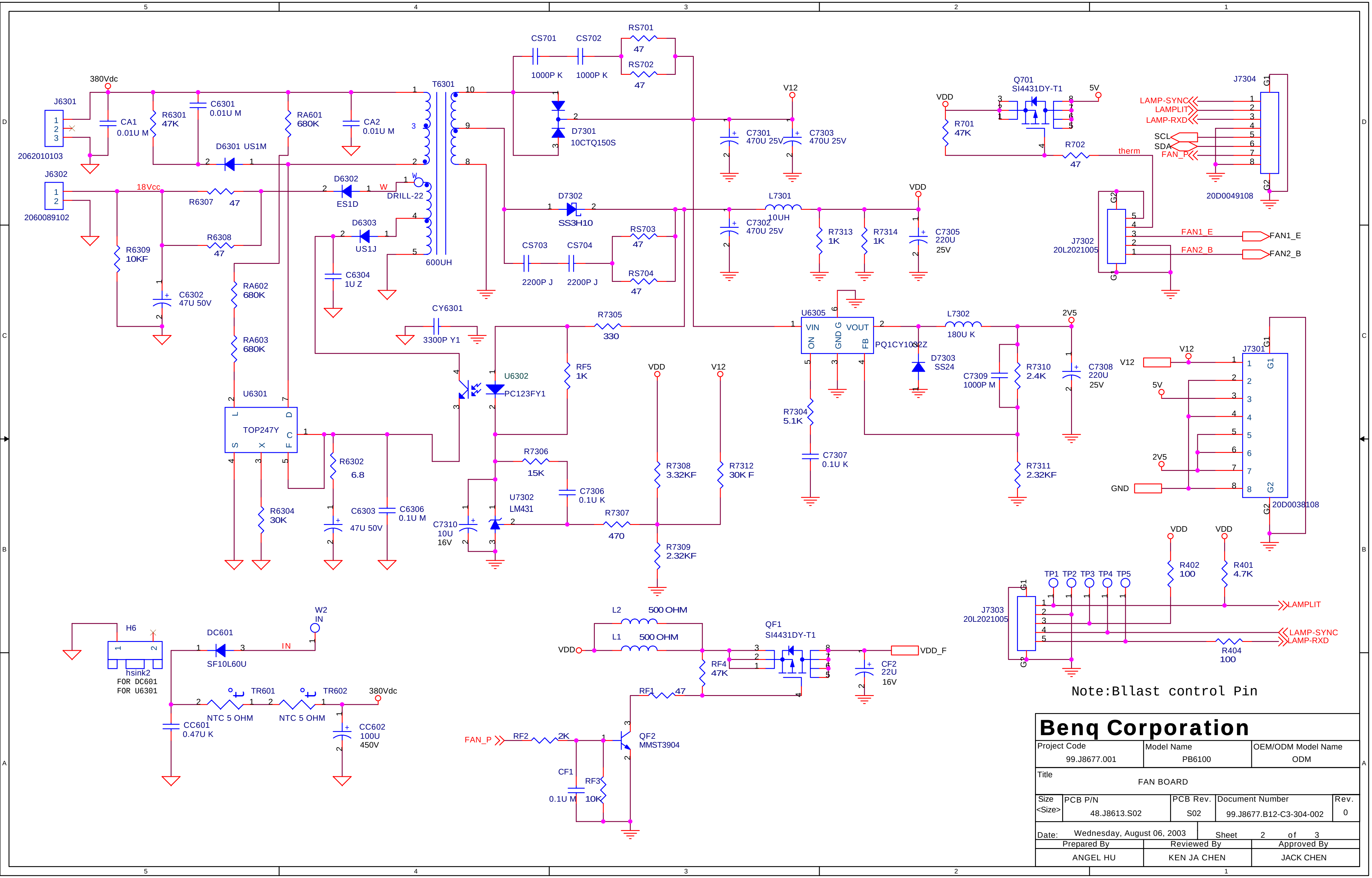


Optical Points

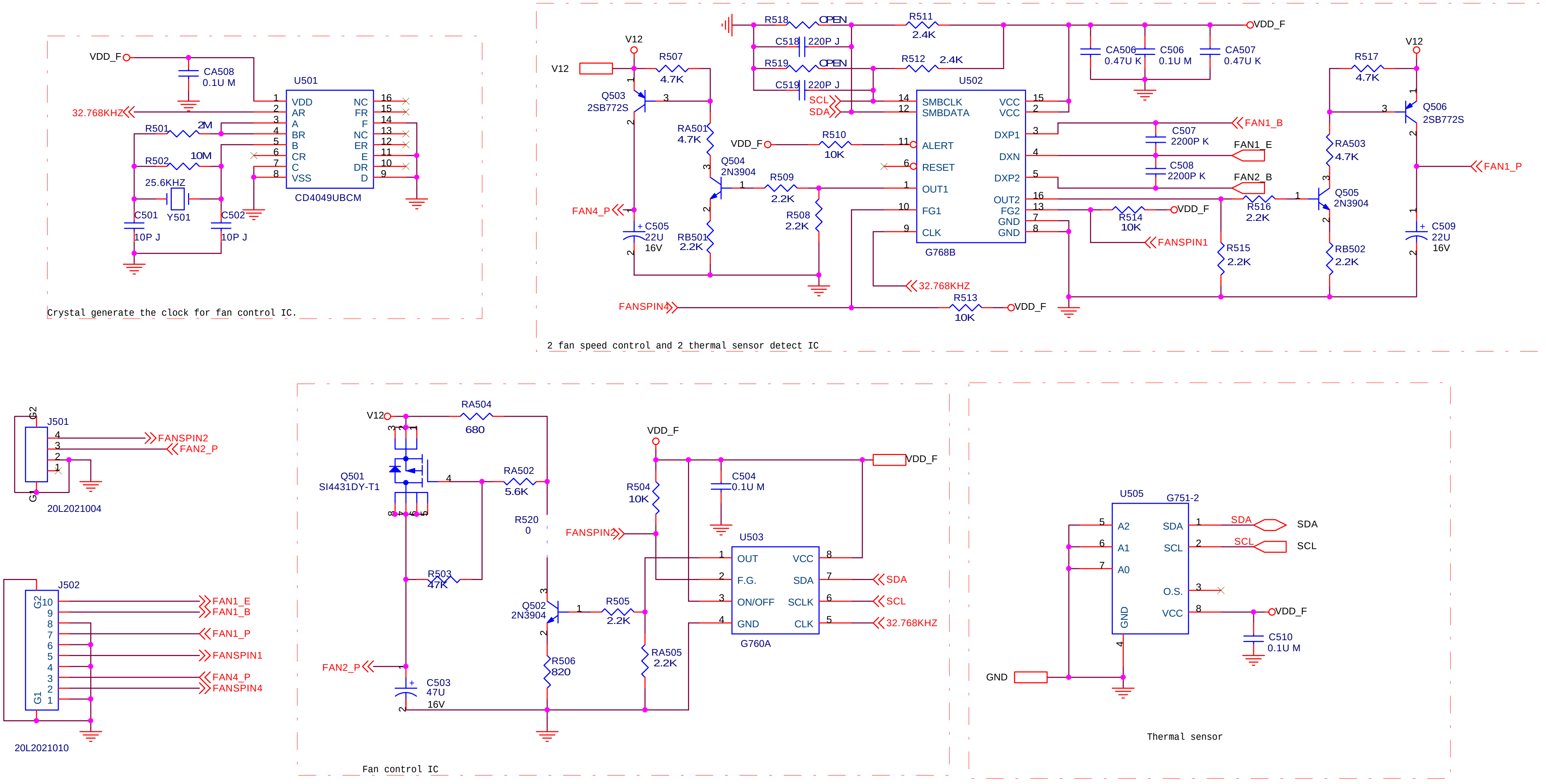


Benq Corporation

Project Code: 99.J8677.001	Model Name: PB6100	OEM/ODM Model Name: ODM	
Title: FAN BOARD			
Size: <Size>	PCB P/N: 48.J8613.S02	PCB Rev.: S02	Document Number: 99.J8677.B12-C3-304-002	Rev.: 0
Date: Wednesday, August 06, 2003	Sheet 1 of 3		
Prepared By: ANGEL HU	Reviewed By: KEN JA CHEN	Approved By: JACK CHEN	



380Vdc
J6301
2062010103
J6302
2060089102
18Vcc
CA1 0.01U M
R6301 47K
C6301 0.01U M
RA601 680K
CA2 0.01U M
D6301 US1M
D6302 ES1D
D6303 US1J
DRILL-22
T6301
600UH
CS701 1000P K
CS702 1000P K
RS701 47
RS702 47
D7301 10CTQ150S
D7302 SS3H10
CS703 2200P J
CS704 2200P J
RS703 47
RS704 47
R6307 47
R6308 47
R6309 10KF
C6302 47U 50V
RA602 680K
RA603 680K
C6304 1U Z
CY6301 3300P Y1
U6301
TOP247Y
R6302 6.8
R6304 30K
C6303 47U 50V
C6306 0.1U M
R7305 330
RF5 1K
U6302 PC123FY1
R7306 15K
C7306 0.1U K
U7302 LM431
C7310 10U 16V
R7307 470
R7308 3.32KF
R7312 30K F
R7309 2.32KF
VDD
V12
5V
2V5
C7301 470U 25V
C7303 470U 25V
C7302 470U 25V
L7301 10UH
R7313 1K
R7314 1K
C7305 220U 25V
U6305 PQ1CY1032Z
VIN VOUT ON GND G FB
L7302 180U K
D7303 SS24
C7309 1000P M
R7310 2.4K
C7308 220U 25V
R7304 5.1K
C7307 0.1U K
R7311 2.32KF
Q701 SI4431DY-T1
R701 47K
R702 47
therm
J7304
20D0049108
LAMP-SYNC
LAMPLIT
LAMP-RXD
SCL
SDA
FAN_P
J7302
20L2021005
FAN1_E
FAN2_B
J7301
20D0038108
GND
H6
hsink2
FOR DC601
FOR U6301
DC601 SF10L60U
W2 IN
TR601 NTC 5 OHM
TR602 NTC 5 OHM
CC601 0.47U K
CC602 100U 450V
L2 500 OHM
L1 500 OHM
QF1 SI4431DY-T1
RF4 47K
RF1 47
CF2 22U 16V
VDD_F
RF2 2K
QF2 MMST3904
CF1 0.1U M
RF3 10K
TP1 TP2 TP3 TP4 TP5
R402 100
R401 4.7K
R404 100
J7303
20L2021005
Note:Bllast control Pin
Benq Corporation
Project Code 99.J8677.001
Model Name PB6100
OEM/ODM Model Name ODM
Title FAN BOARD
Size <Size>
PCB P/N 48.J8613.S02
PCB Rev. S02
Document Number 99.J8677.B12-C3-304-002
Rev. 0
Date: Wednesday, August 06, 2003
Sheet 2 of 3
Prepared By ANGEL HU
Reviewed By KEN JA CHEN
Approved By JACK CHEN



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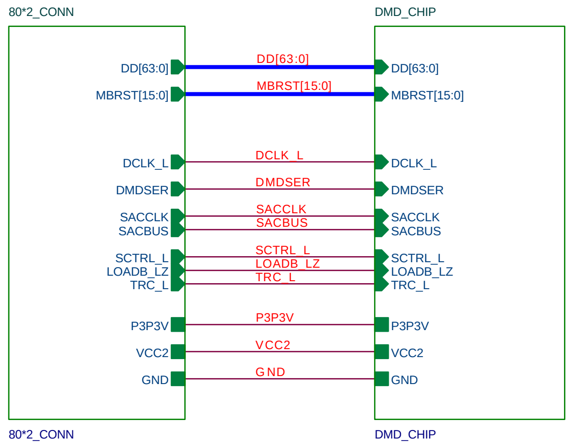
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99.J8677.001	PB6100	ODM

Title: FAN BOARD

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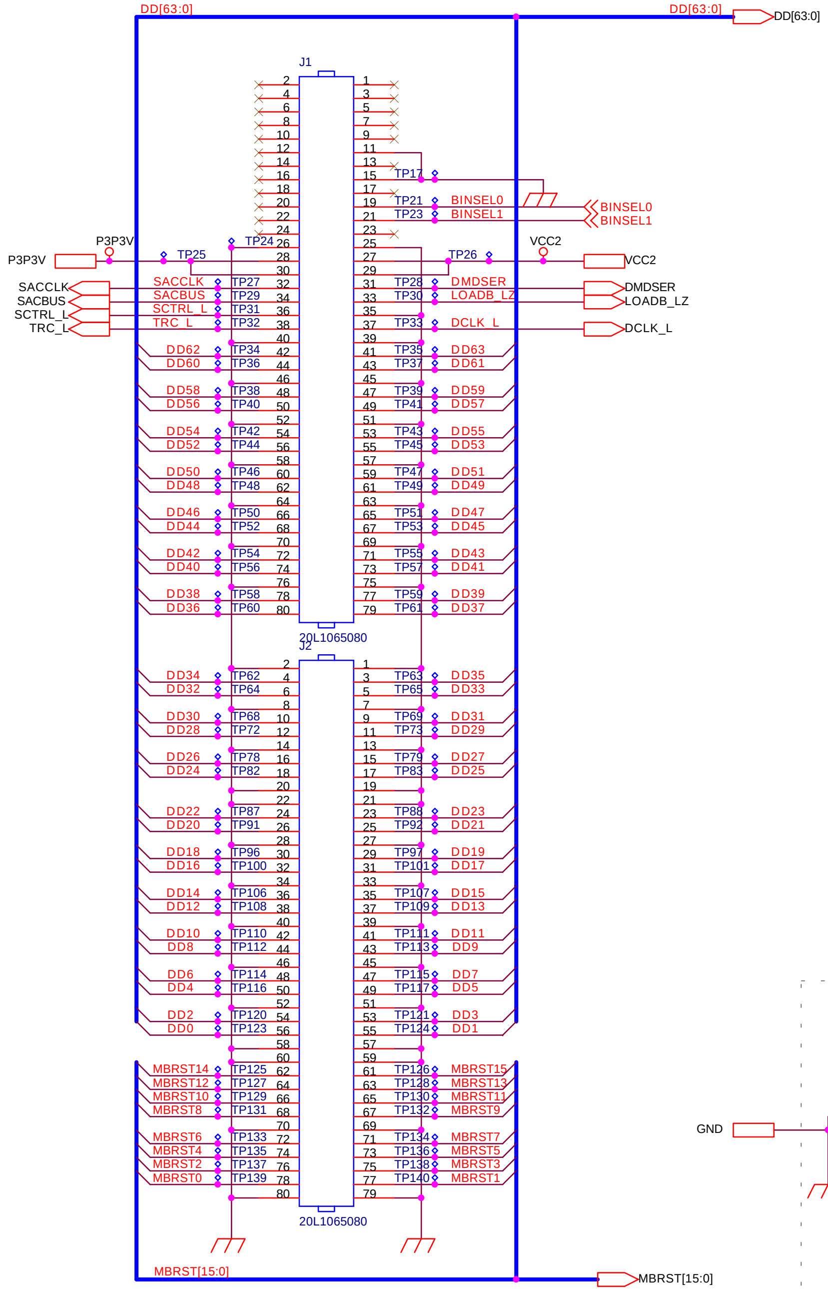
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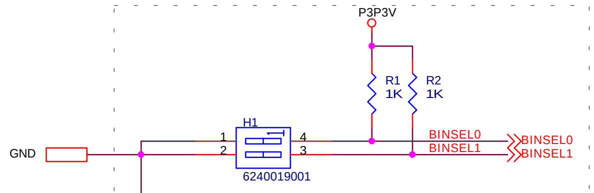
Prepared By	Reviewed By	Approved By
ANGEL HU	KEN JA CHEN	JACK CHEN



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Project Code 99.J8677.001	Model Name PB6100	OEM/ODM Model Name ODM
Title CHIP BOARD		
Size <Size> / PCB P/N 48.J8623.S01	PCB Rev. S01 / Document Number 99.J8677.B12-C3-304-003	Rev. 0
Date: Wednesday, August 06, 2003	Sheet 1 of 3	
Prepared By ANGEL HU	Reviewed By DAVID HN LIN	Approved By KELVIN LIAO





BINSEL1	BINSEL0	DMD Bin
0	0	B
0	1	C
1	0	D
1	1	E

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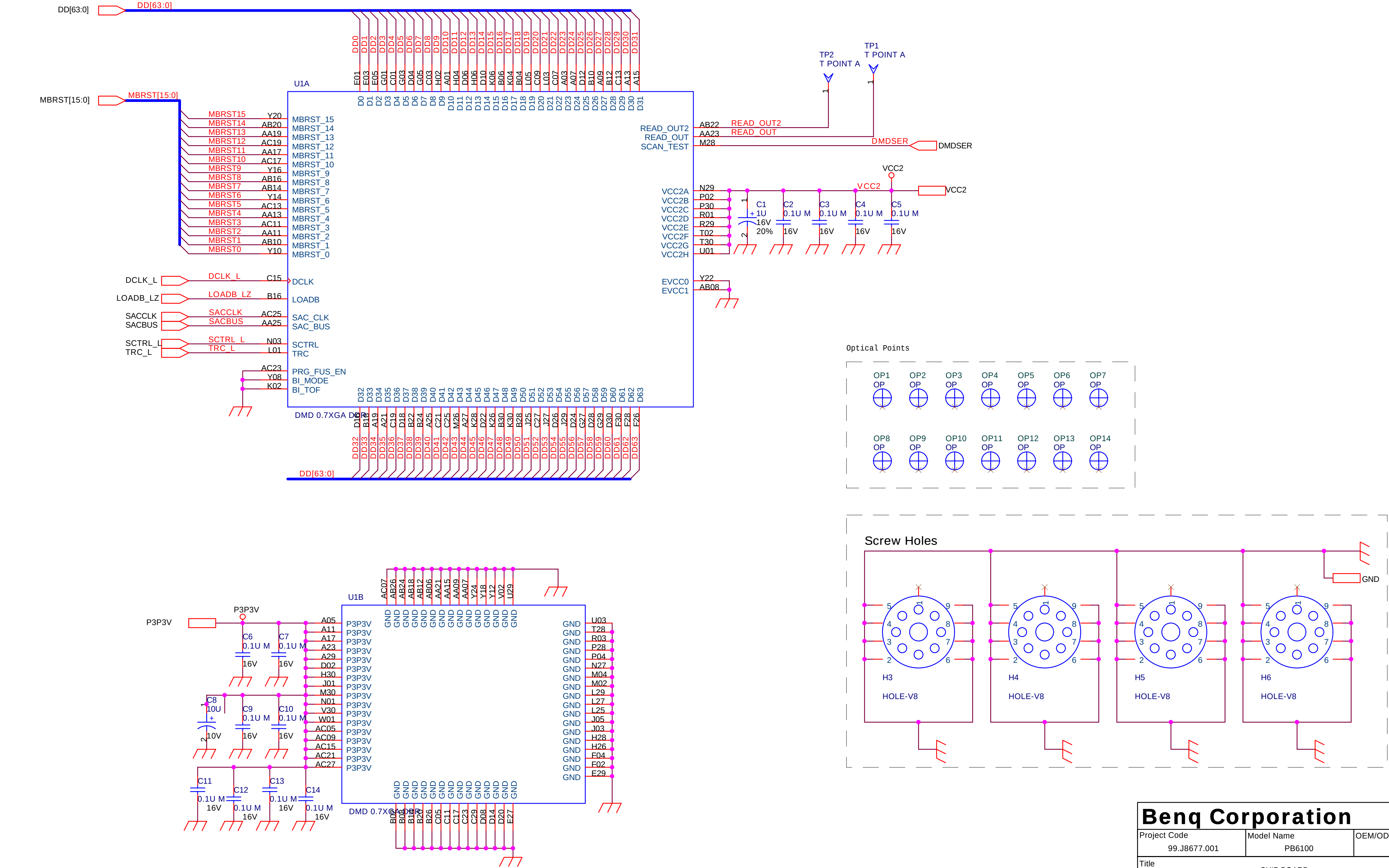
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99.J8677.001	PB6100	ODM

Title: CHIP BOARD

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Date: Wednesday, August 06, 2003 Sheet 2 of 3

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO

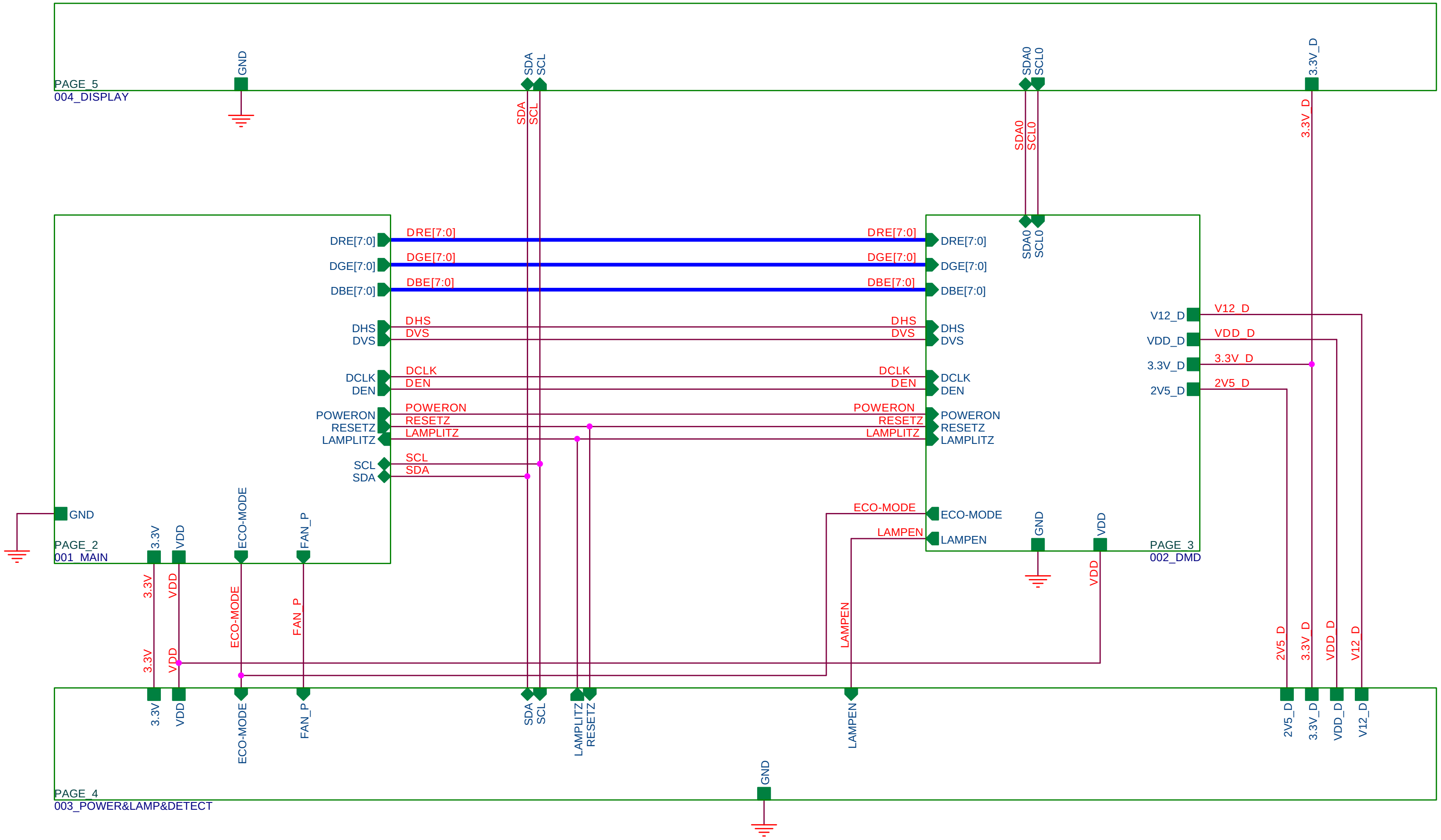


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Project Code	Model Name	OEM/ODM Model Name
99.J8677.001	PB6100	ODM

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Date: Wednesday, August 06, 2003		Sheet 3 of 3		

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO



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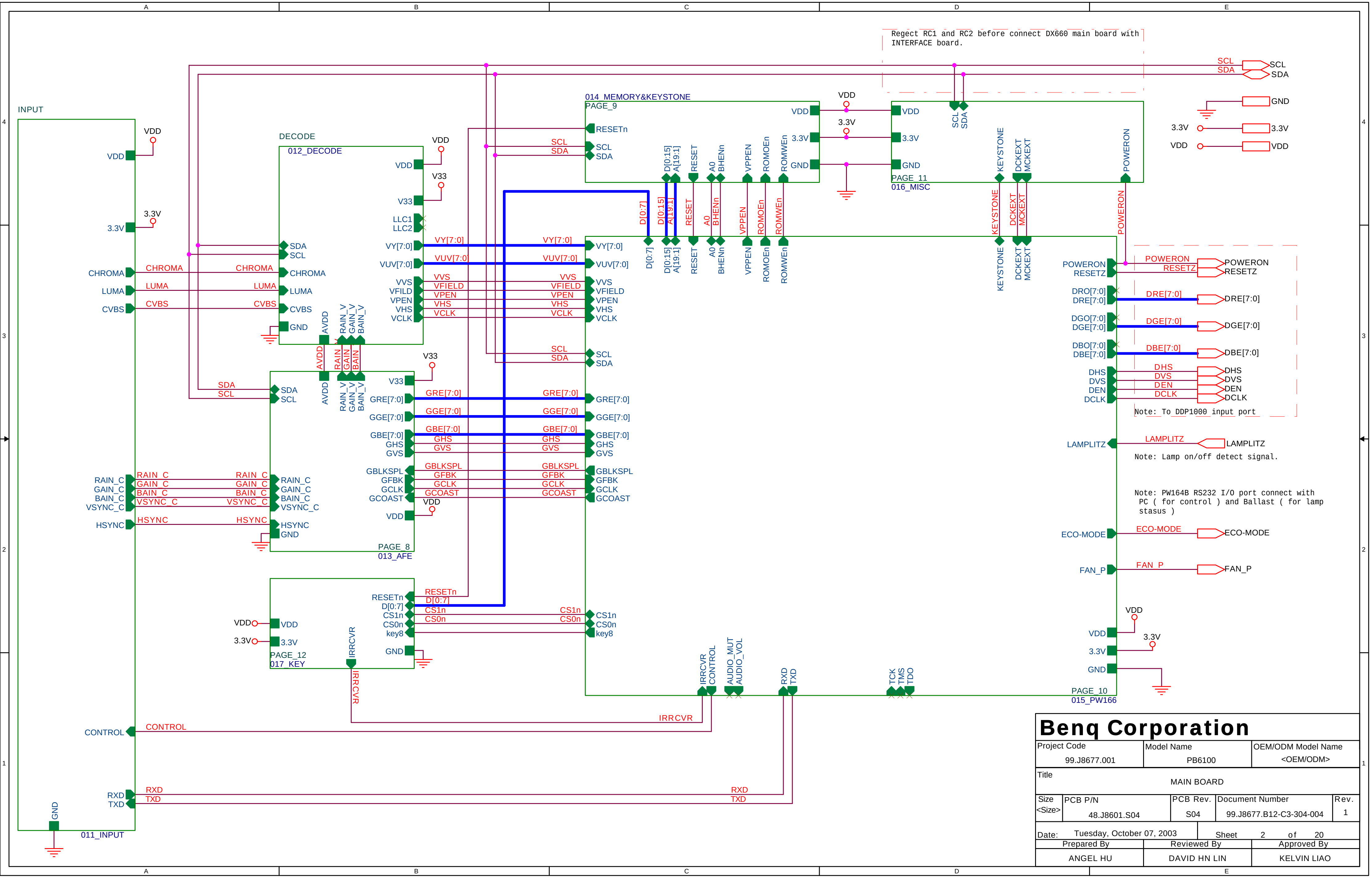
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Title	
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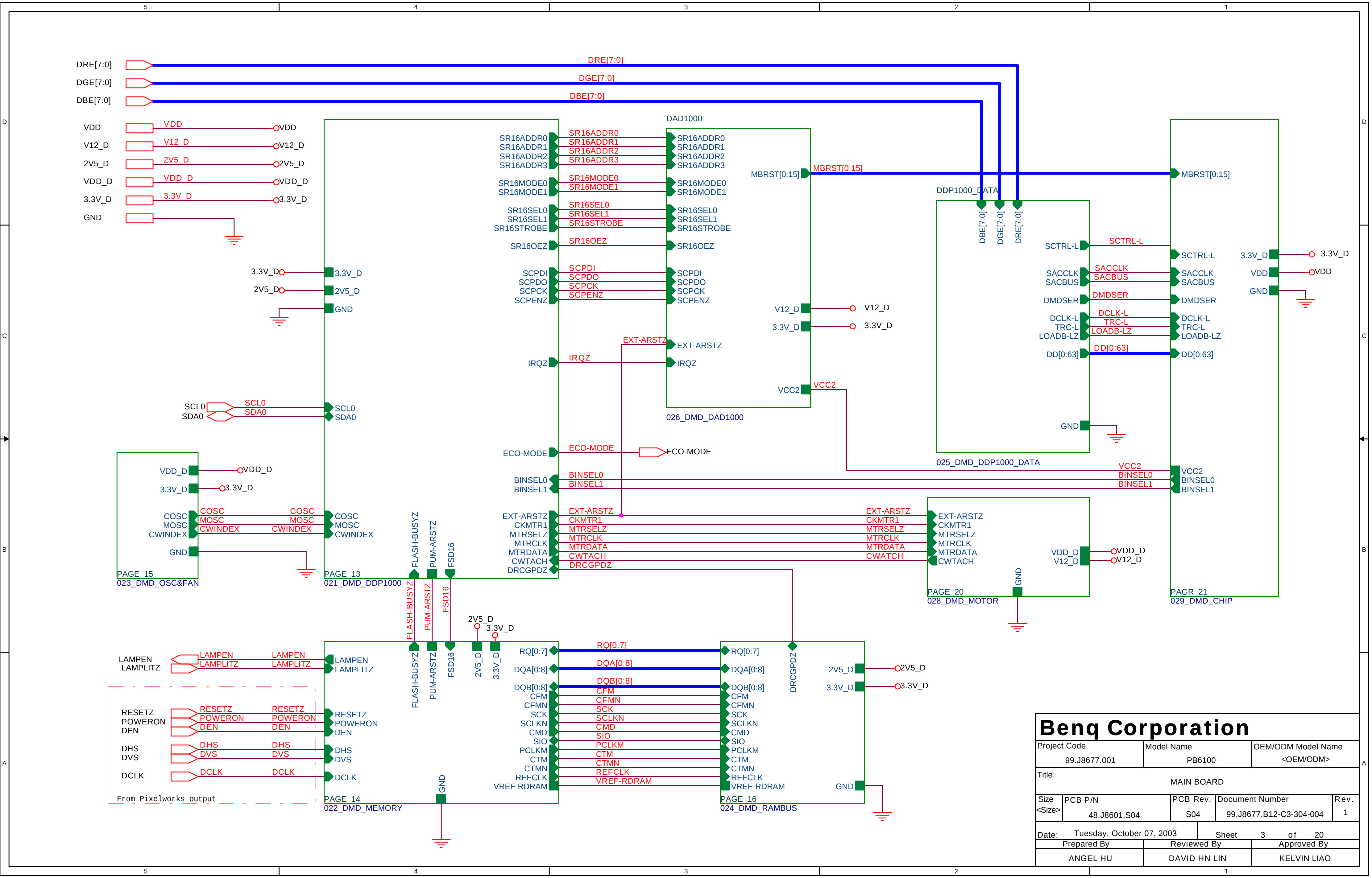
Date:	Tuesday, October 07, 2003	Sheet	1	of	20

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO

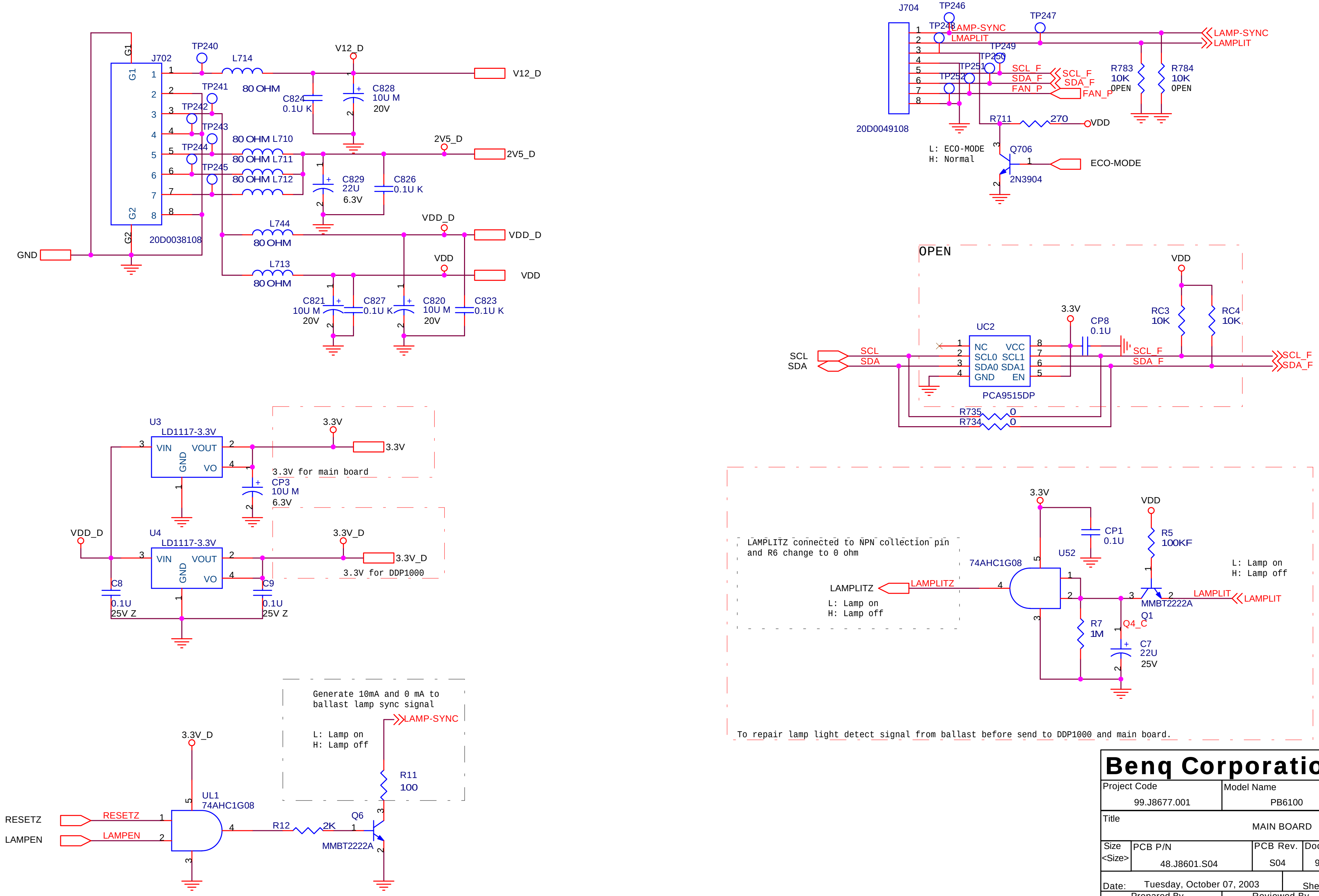


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Document Number: 99.J8677.B12-C3-304-004	Rev.: 1	
Date: Tuesday, October 07, 2003	Sheet 2 of 20	
Prepared By: ANGEL HU	Reviewed By: DAVID HN LIN	Approved By: KELVIN LIAO



DRE[7:0]
DGE[7:0]
DBE[7:0]
VDD
V12_D
2V5_D
VDD_D
3.3V_D
GND
DAD1000
SR16ADDR0
SR16ADDR1
SR16ADDR2
SR16ADDR3
SR16MODE0
SR16MODE1
SR16SEL0
SR16SEL1
SR16STROBE
SR16OEZ
SCPDI
SCPDO
SCPCK
SCPENZ
MBRST[0:15]
EXT-ARSTZ
IRQZ
VCC2
026_DMD_DAD1000
DDP1000_DATA
SCTRL-L
SACCLK
SACBUS
DMDSER
DCLK-L
TRC-L
LOADB-LZ
DD[0:63]
025_DMD_DDP1000_DATA
SCL0
SDA0
ECO-MODE
BINSEL0
BINSEL1
PAGE_15
023_DMD_OSC&FAN
COSC
MOSC
CWINDEX
CKMTR1
MTRSELZ
MTRCLK
MTRDATA
CWTACH
DRCGPDZ
PAGE_13
021_DMD_DDP1000
FLASH-BUSYZ
PUM-ARSTZ
FSD16
PAGE_20
028_DMD_MOTOR
PAGR_21
029_DMD_CHIP
LAMPEN
LAMPLITZ
RESETZ
POWERON
DEN
DHS
DVS
DCLK
From Pixelworks output
RQ[0:7]
DQA[0:8]
DQB[0:8]
CFM
CFMN
SCK
SCLKN
CMD
SIO
PCLKM
CTM
CTMN
REFCLK
VREF-RDRAM
PAGE_14
022_DMD_MEMORY
PAGE_16
024_DMD_RAMBUS
Benq Corporation
Project Code 99.J8677.001
Model Name PB6100
OEM/ODM Model Name <OEM/ODM>
Title MAIN BOARD
Size <Size>
PCB P/N 48.J8601.S04
PCB Rev. S04
Document Number 99.J8677.B12-C3-304-004
Rev. 1
Date: Tuesday, October 07, 2003
Sheet 3 of 20
Prepared By ANGEL HU
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Approved By KELVIN LIAO



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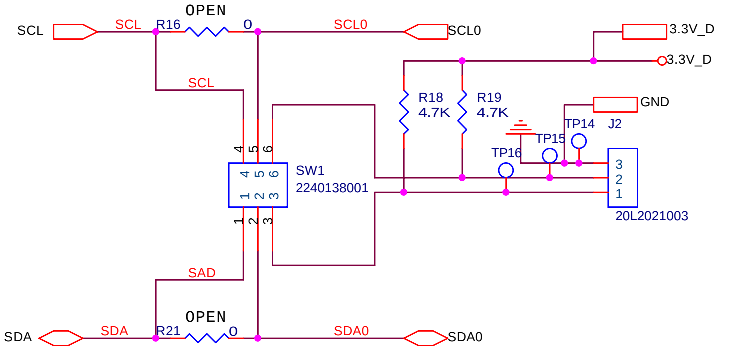
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99.J8677.001	PB6100	<OEM/ODM>

Title	
	MAIN BOARD

Size	PCB P/N	PCB Rev.	Document Number	Rev.
<Size>	48.J8601.S04	S04	99.J8677.B12-C3-304-004	1

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SW1 is the switch to choice DDP1000 I2C would be connected with Pixelwork
I2C or not. J2 is the connector to DDP1000 I2C download by DDP1000 composer.

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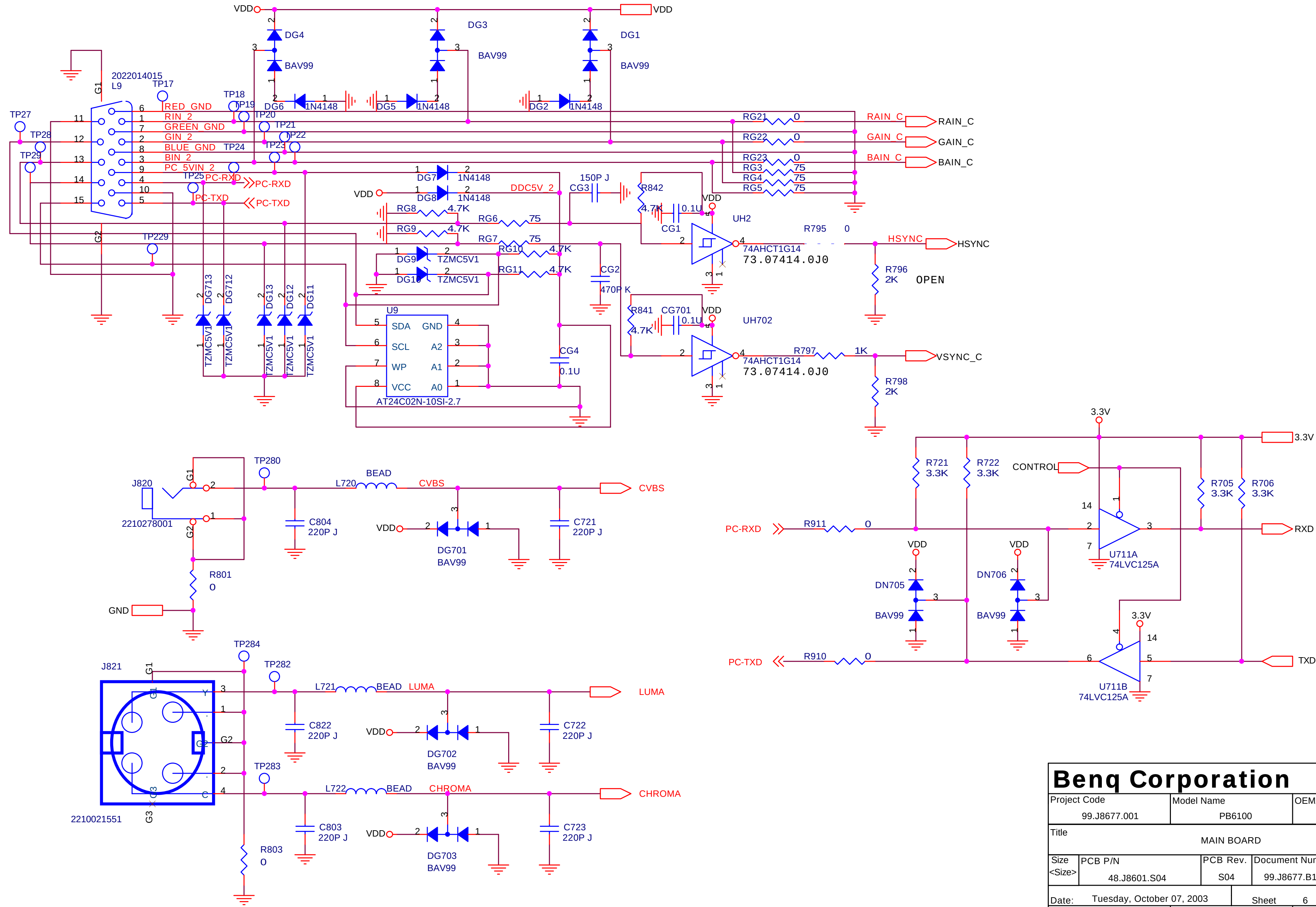
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99.J8677.001	PB6100	<OEM/ODM>

Title: MAIN BOARD

Size	PCB P/N	PCB Rev.	Document Number	Rev.
<Size>	48.J8601.S04	S04	99.J8677.B12-C3-304-004	1

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Prepared By	Reviewed By	Approved By
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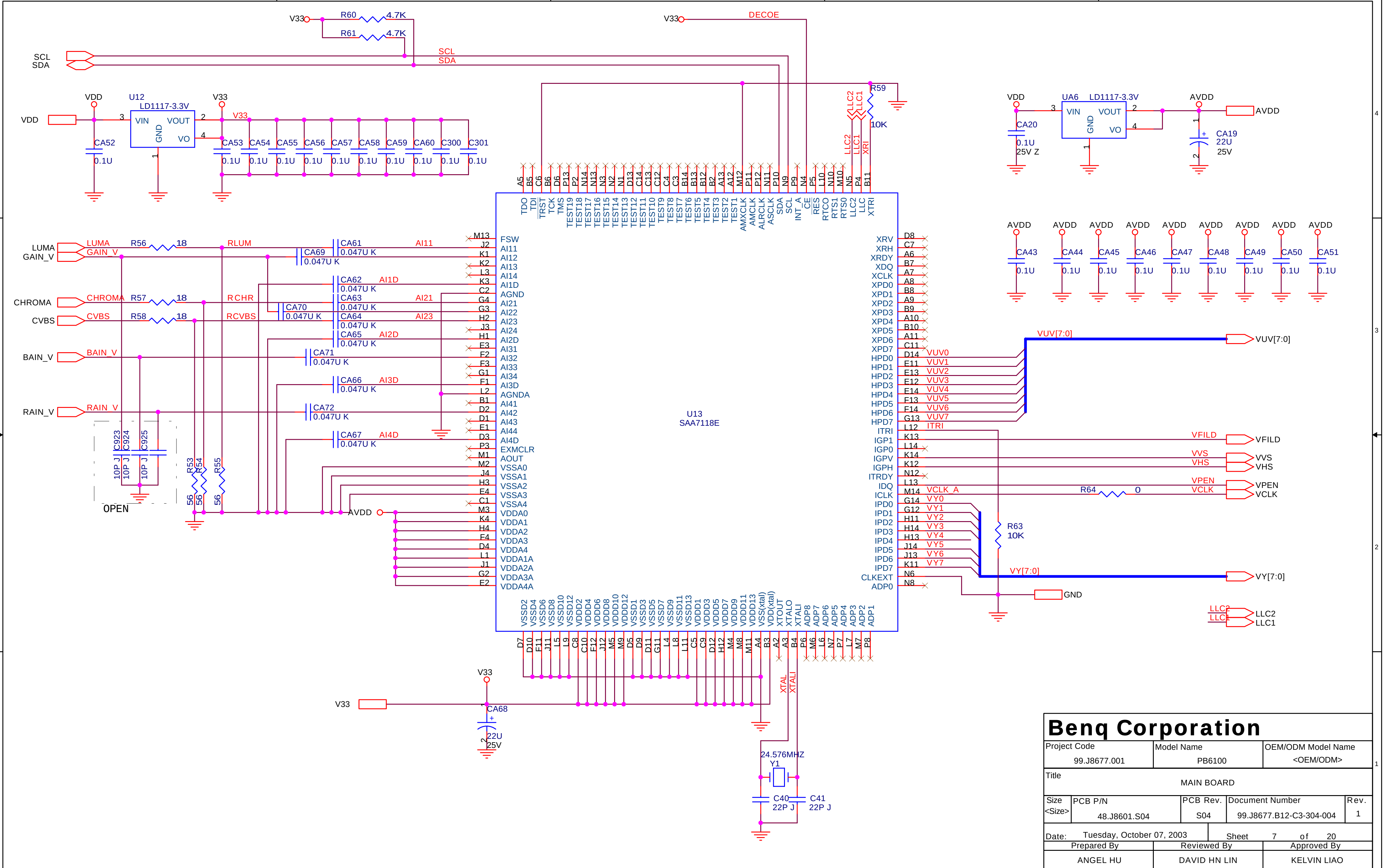
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99.J8677.001	PB6100	<OEM/ODM>

Title: MAIN BOARD

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Date: Tuesday, October 07, 2003 — Sheet 6 of 20

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO



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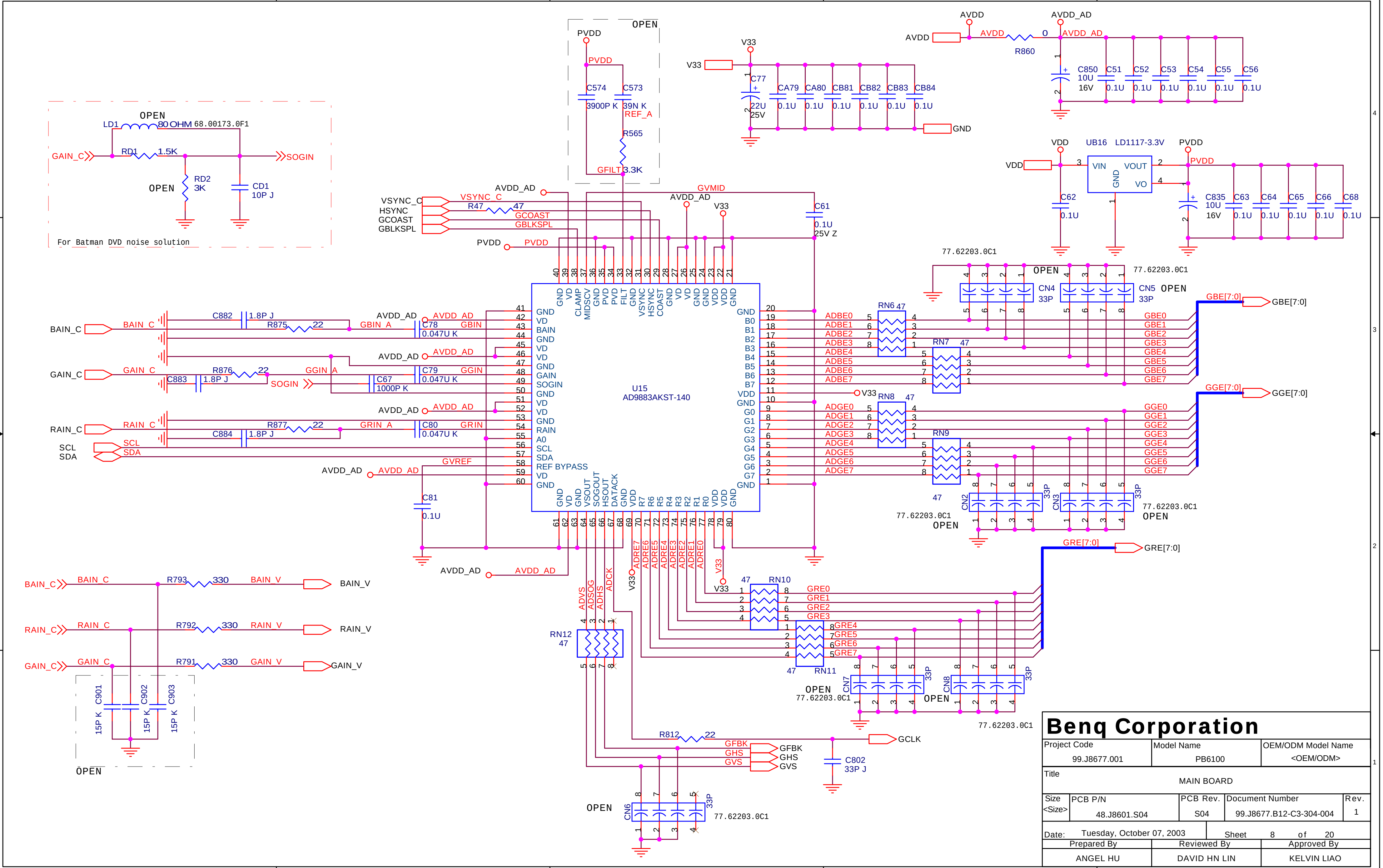
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99.J8677.001	PB6100	<OEM/ODM>

Title	
	MAIN BOARD

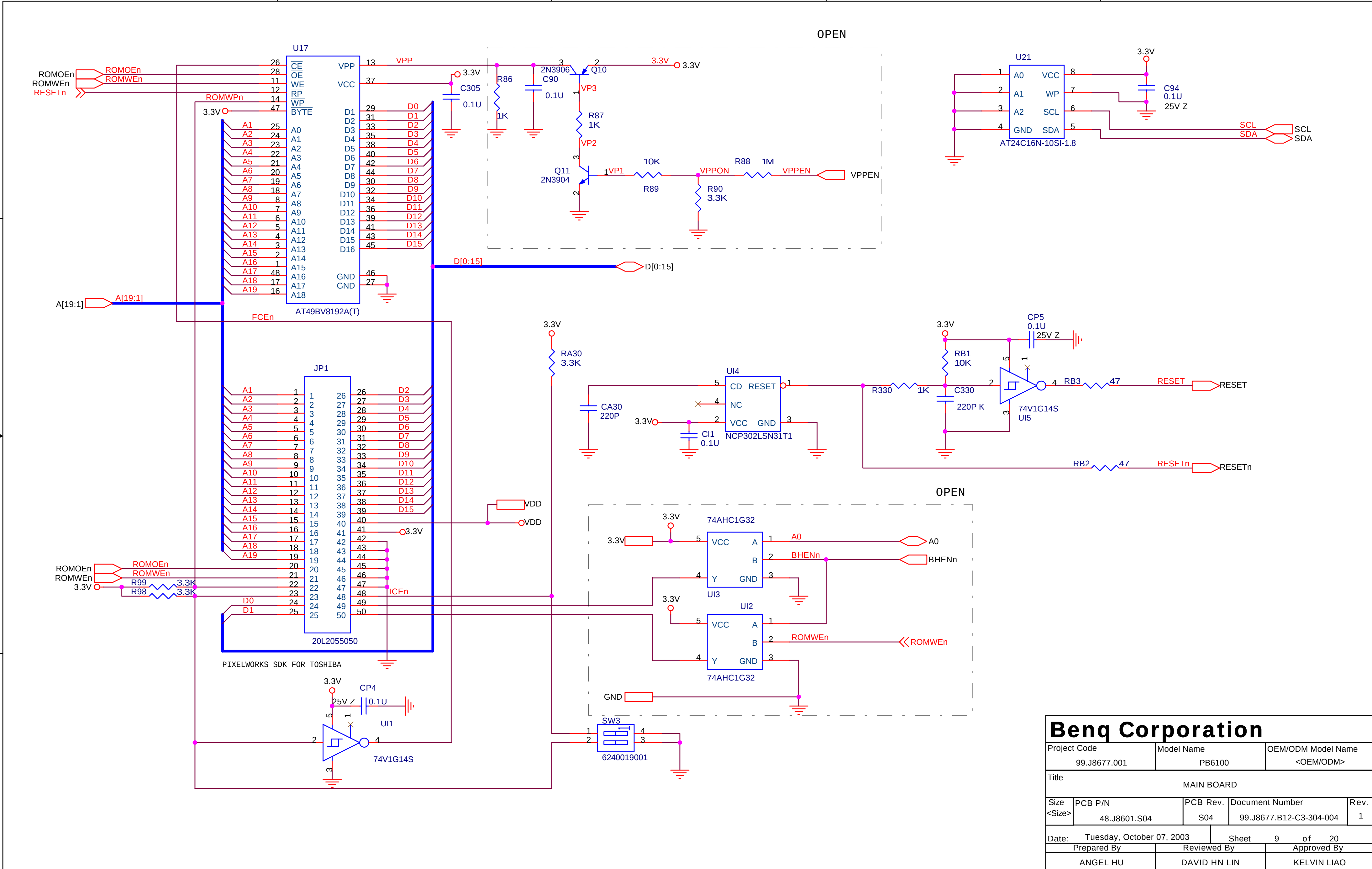
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Date: Tuesday, October 07, 2003 Sheet 7 of 20

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO



Benq Corporation		
Project Code: 99.J8677.001	Model Name: PB6100	OEM/ODM Model Name: <OEM/ODM>
Title: MAIN BOARD		
Size: <Size>	PCB P/N: 48.J8601.S04	PCB Rev.: S04
Document Number: 99.J8677.B12-C3-304-004	Rev.: 1	
Date: Tuesday, October 07, 2003	Sheet 8 of 20	
Prepared By: ANGEL HU	Reviewed By: DAVID HN LIN	Approved By: KELVIN LIAO



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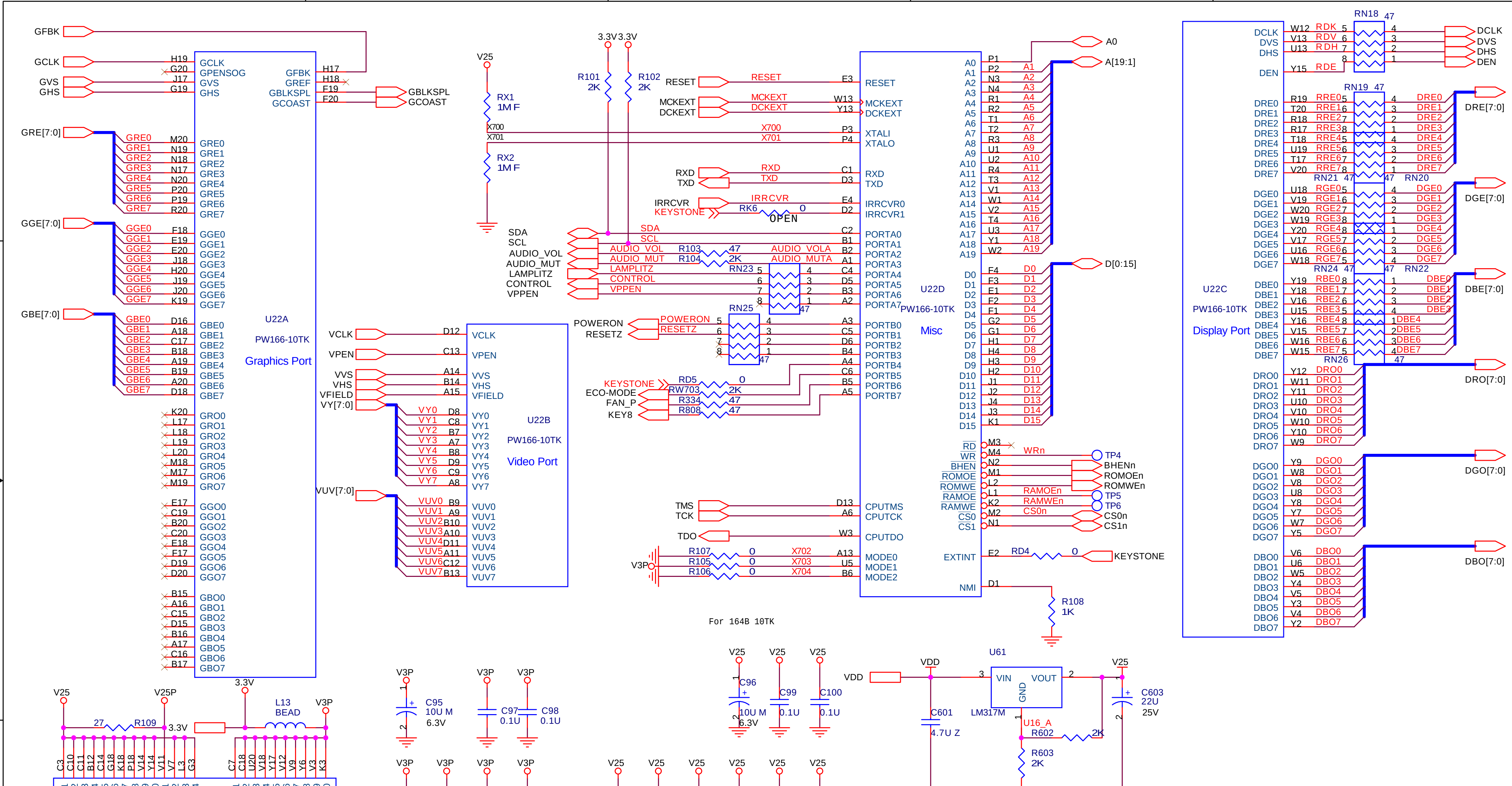
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Title: MAIN BOARD

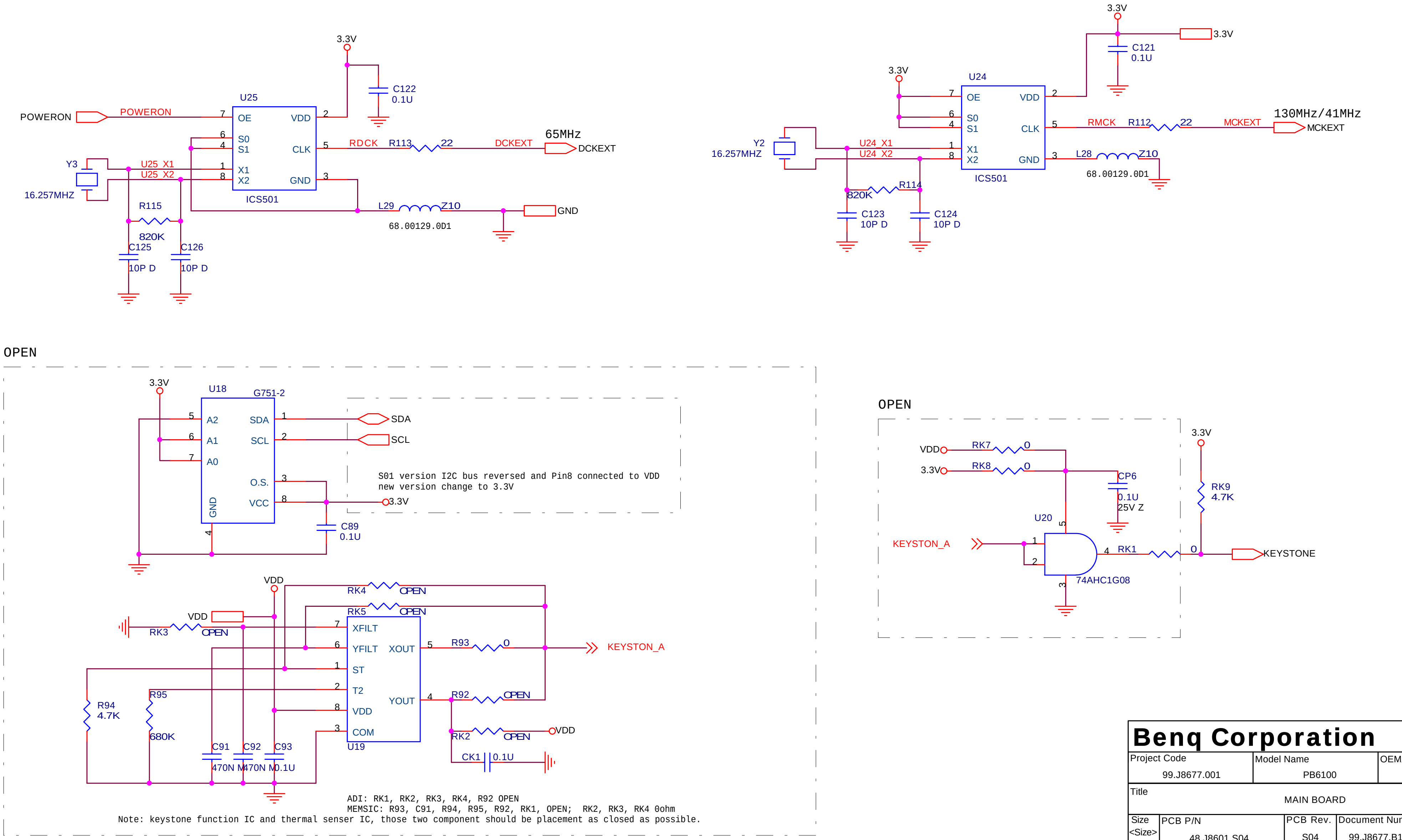
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Date: Tuesday, October 07, 2003 — Sheet 9 of 20

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO



Benq Corporation				
Project Code: 99.J8677.001	Model Name: PB6100	OEM/ODM Model Name: <OEM/ODM>		
Title: MAIN BOARD				
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Date: Tuesday, October 07, 2003		Sheet 10 of 20		
Prepared By: ANGEL HU	Reviewed By: DAVID HN LIN	Approved By: KELVIN LIAO		



Benq Corporation

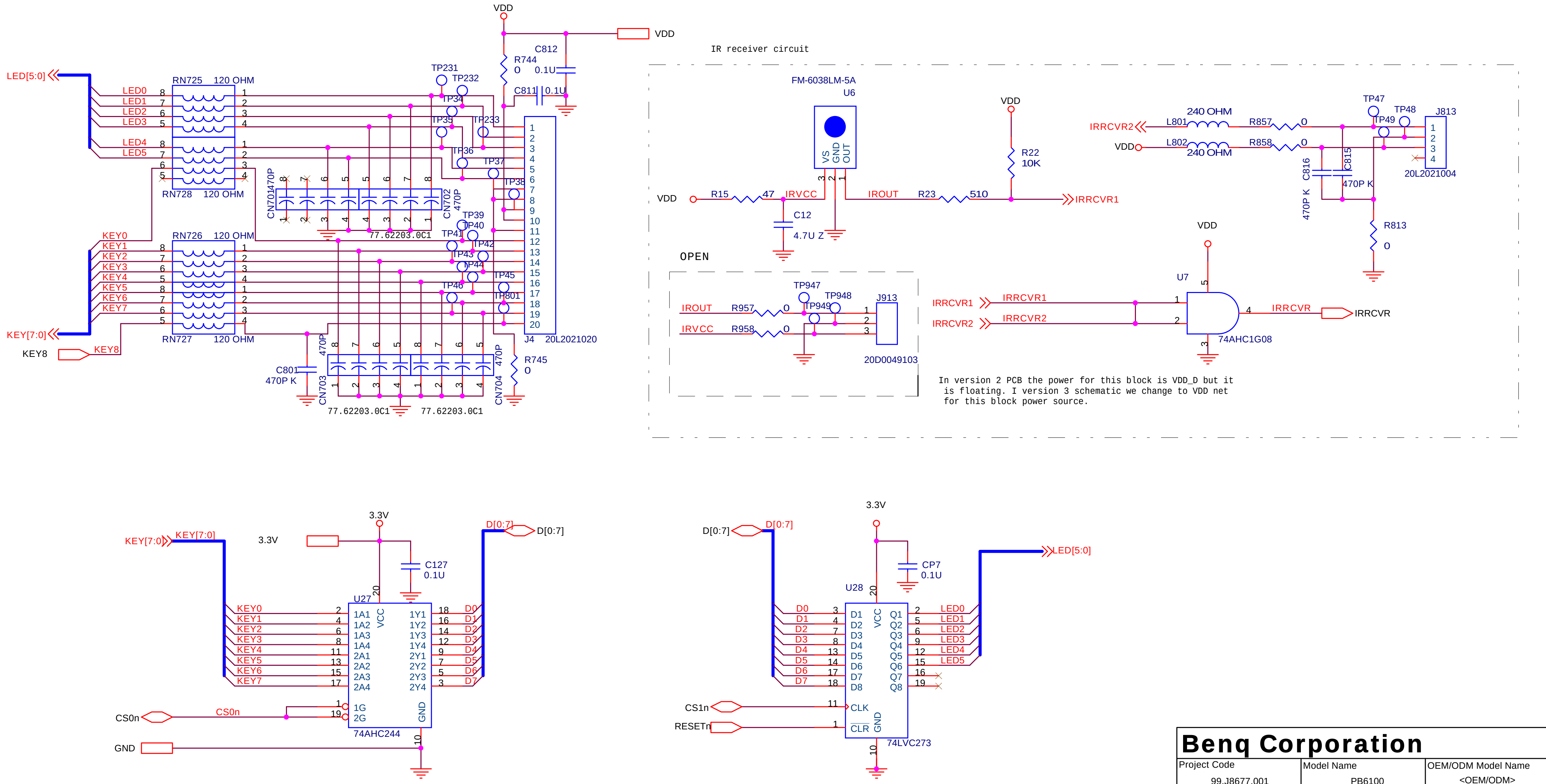
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Title: MAIN BOARD

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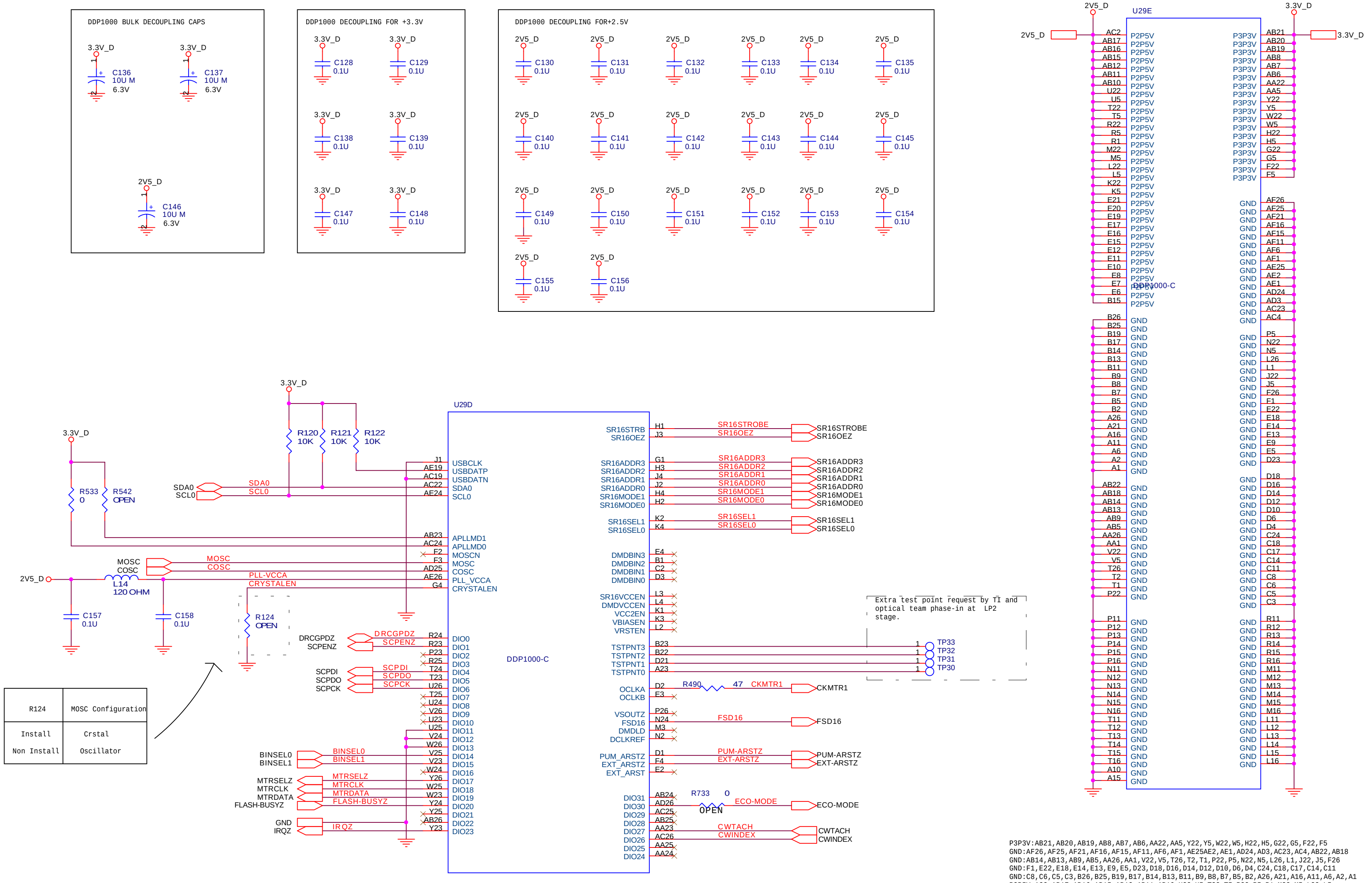
Date: Tuesday, October 07, 2003 — Sheet 11 of 20

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO



Benq Corporation

Project Code: 99.J8677.001	Model Name: PB6100	OEM/ODM Model Name: <OEM/ODM>
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Document Number: 99.J8677.B12-C3-304-004	Rev.: 1	
Date: Tuesday, October 07, 2003	Sheet 12 of 20	
Prepared By: ANGEL HU	Reviewed By: DAVID HN LIN	Approved By: KELVIN LIAO



R124	MOSC Configuration
Install	Crstal
Non Install	Oscillator

P3P3V:AB21,AB20,AB19,AB8,AB7,AB6,AA22,AA5,Y22,Y5,W22,W5,H22,H5,G22,G5,F22,F5
GND:AF26,AF25,AF21,AF16,AF15,AF11,AF6,AF1,AE25AE2,AE1,AD24,AD3,AC23,AC4,AB22,AB18
GND:AB14,AB13,AB9,AB5,AA26,AA1,V22,V5,T26,T2,T1,P22,P5,N22,N5,L26,L1,J22,J5,F26
GND:F1,E22,E18,E14,E13,E9,E5,D23,D18,D16,D14,D12,D10,D6,D4,C24,C18,C17,C14,C11
GND:C8,C6,C5,C3,B26,B25,B19,B17,B14,B13,B11,B9,B8,B7,B5,B2,A26,A21,A16,A11,A6,A2,A1
P2P5V:AC2,AB17,AB16,AB15,AB12,AB11,AB10,U22,U5,T22,T5,R22,R5,R1,M22,M5,L22,L5
P2P5V:K22,K5,E21,E20,E19,E17,E16,E15,E12,E11,E10,E8,E7,E6,B15,
GND:P11,P12,P13,P14,P15,P16,N11,N12,N13,N14,N15,N16,T11,T12,T13,T14,T15,T16,
GND:R11,R12,R13,R14,R15,R16,M11,M12,M13,M14,M15,M16,L11,L12,L13,L14,L15,L16,A10,A15

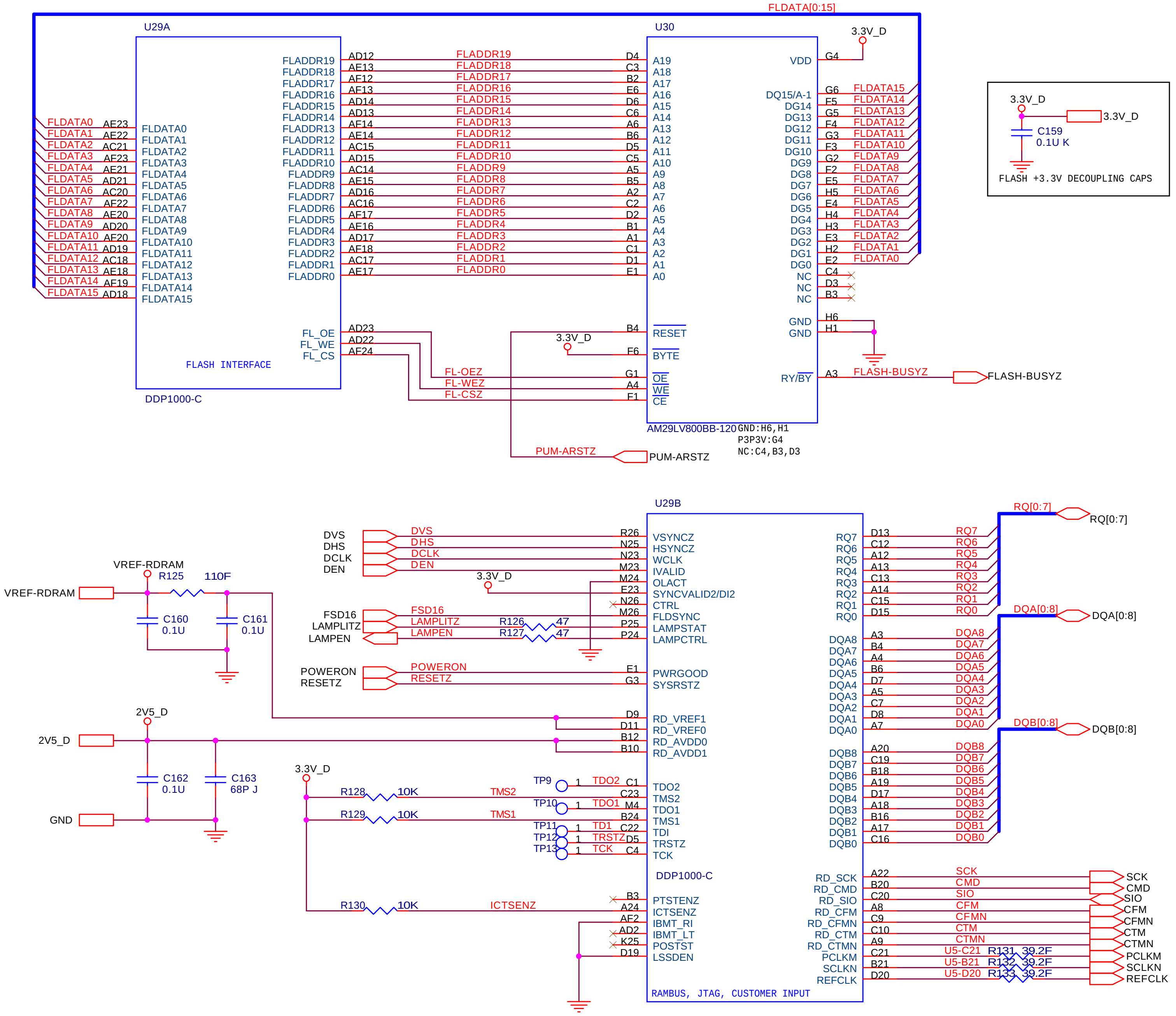
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Date: Tuesday, October 07, 2003 Sheet 13 of 20

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO



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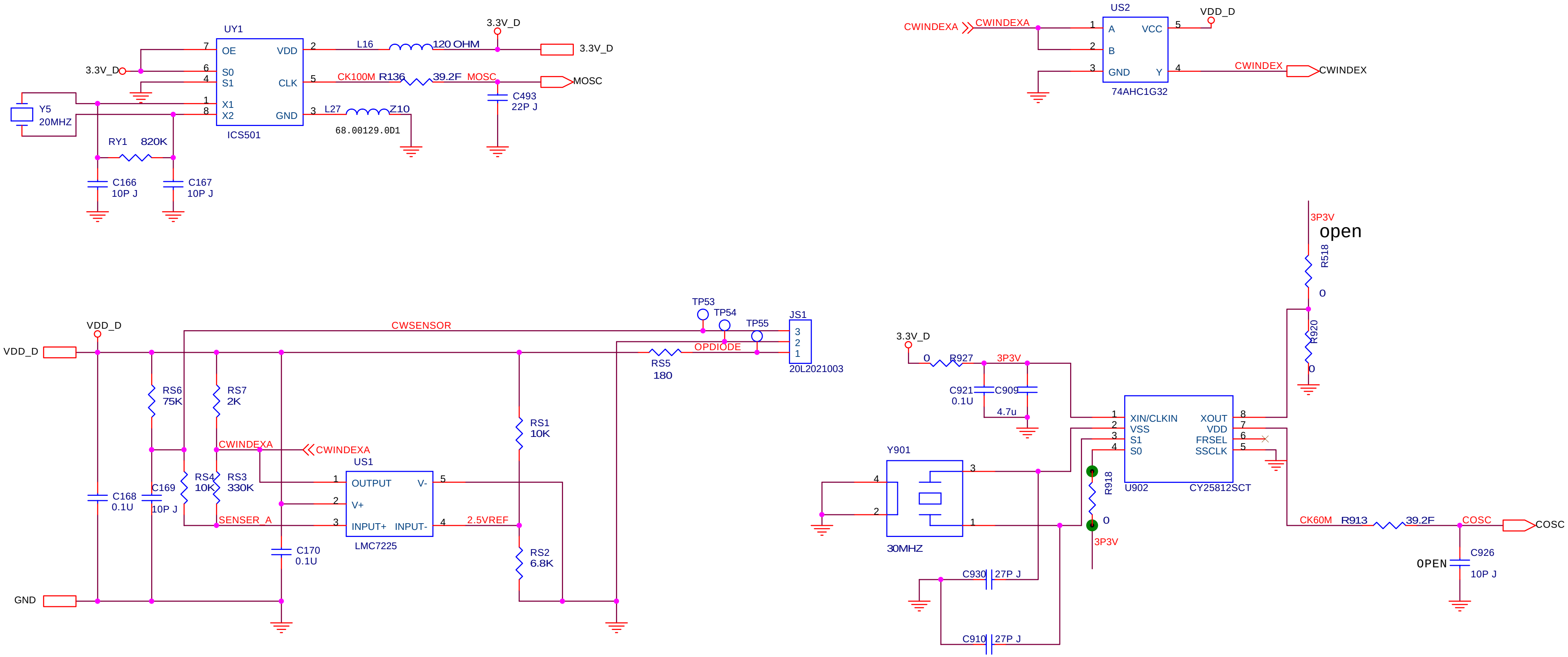
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99.J8677.001	PB6100	<OEM/ODM>

Title	
MAIN BOARD	

Size	PCB P/N	PCB Rev.	Document Number	Rev.
<Size>	48.J8601.S04	S04	99.J8677.B12-C3-304-004	1

Date: Tuesday, October 07, 2003 — Sheet 14 of 20

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO

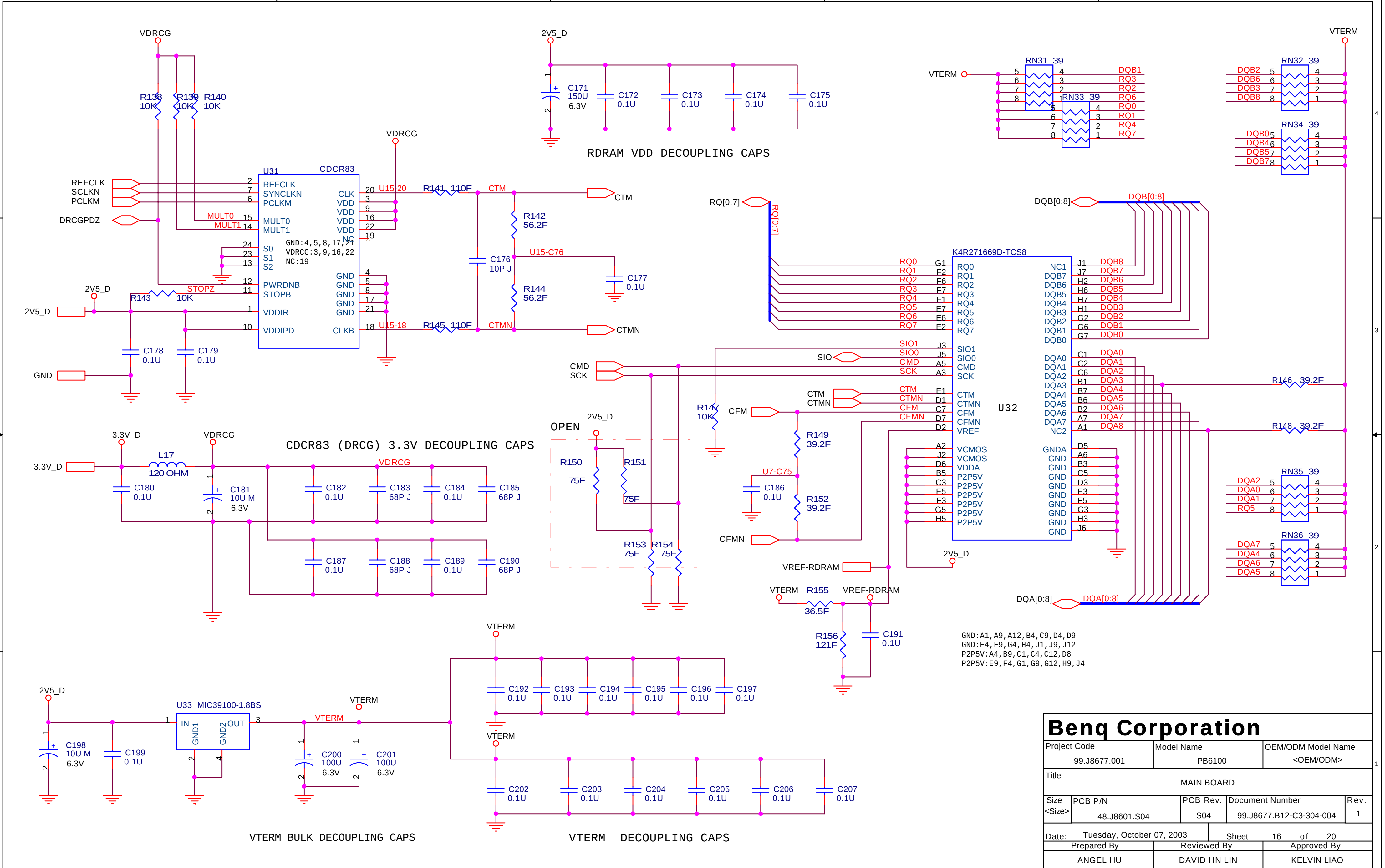


Benq Corporation		
Project Code: 99.J8677.001	Model Name: PB6100	OEM/ODM Model Name: <OEM/ODM>
Title: MAIN BOARD		

Size	PCB P/N	PCB Rev.	Document Number	Rev.
<Size>	48.J8601.S04	S04	99.J8677.B12-C3-304-004	1

Date: Tuesday, October 07, 2003 — Sheet 15 of 20

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO



Benq Corporation

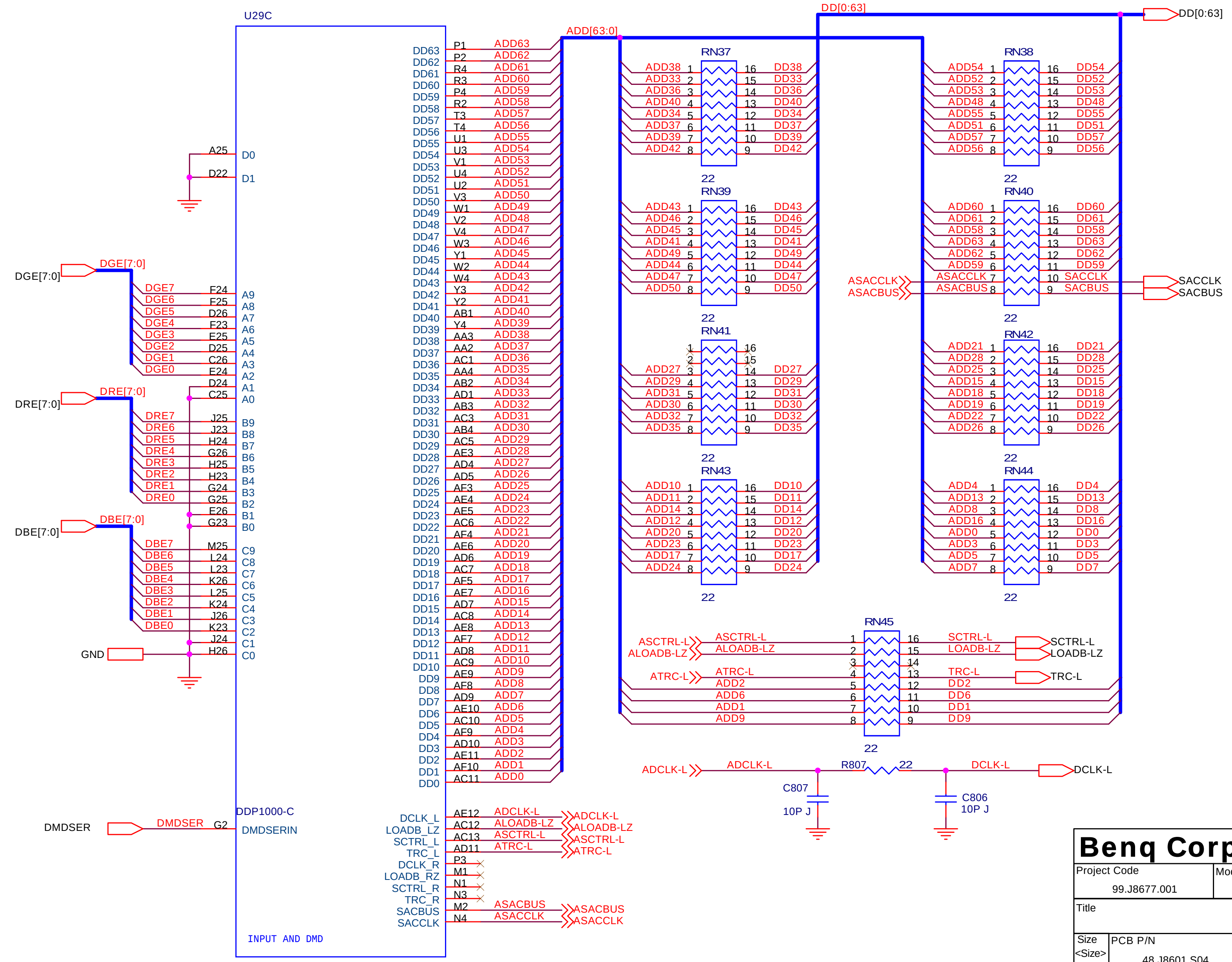
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99.J8677.001	PB6100	<OEM/ODM>

Title: MAIN BOARD

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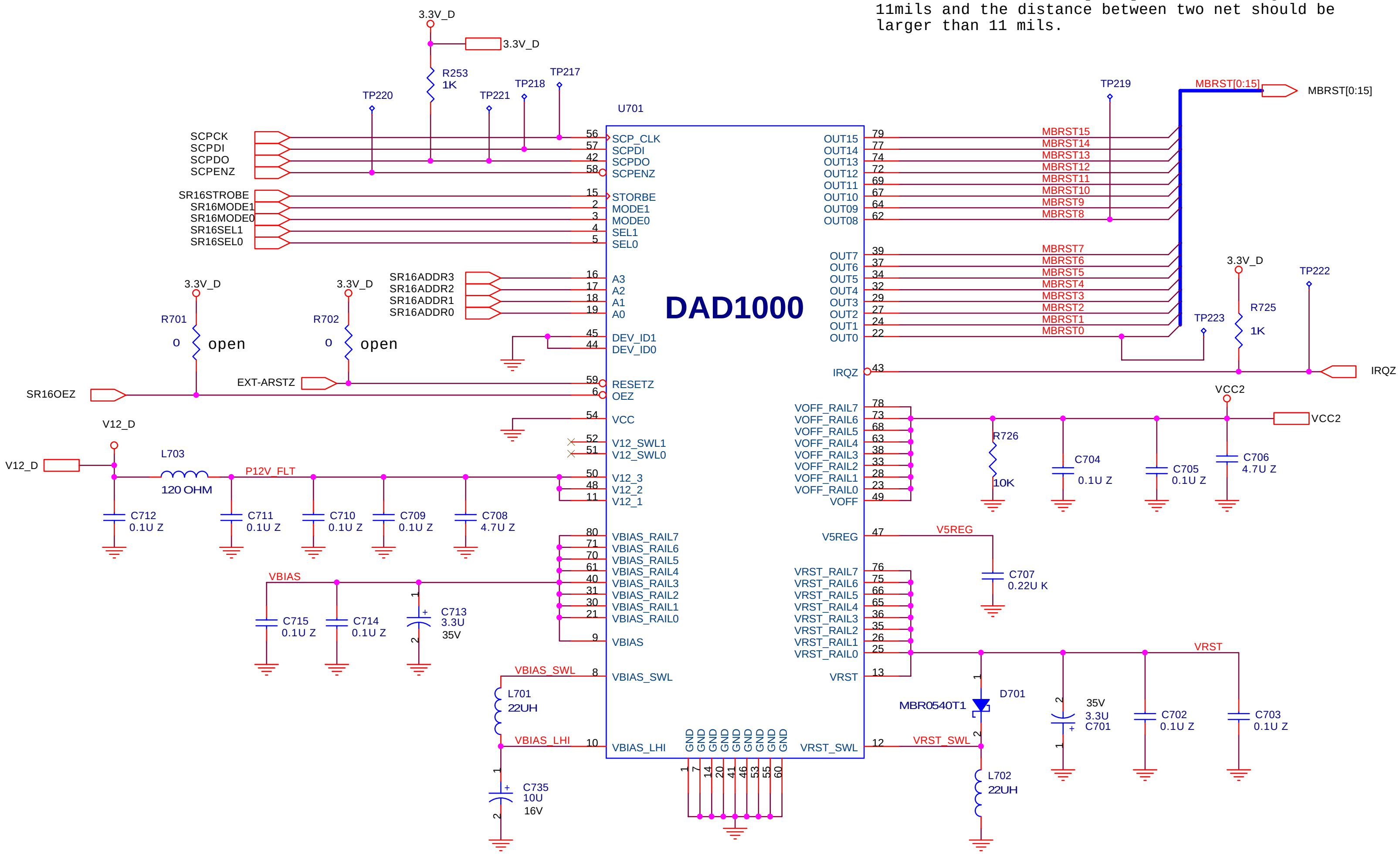
Date: Tuesday, October 07, 2003 — Sheet 16 of 20

Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO

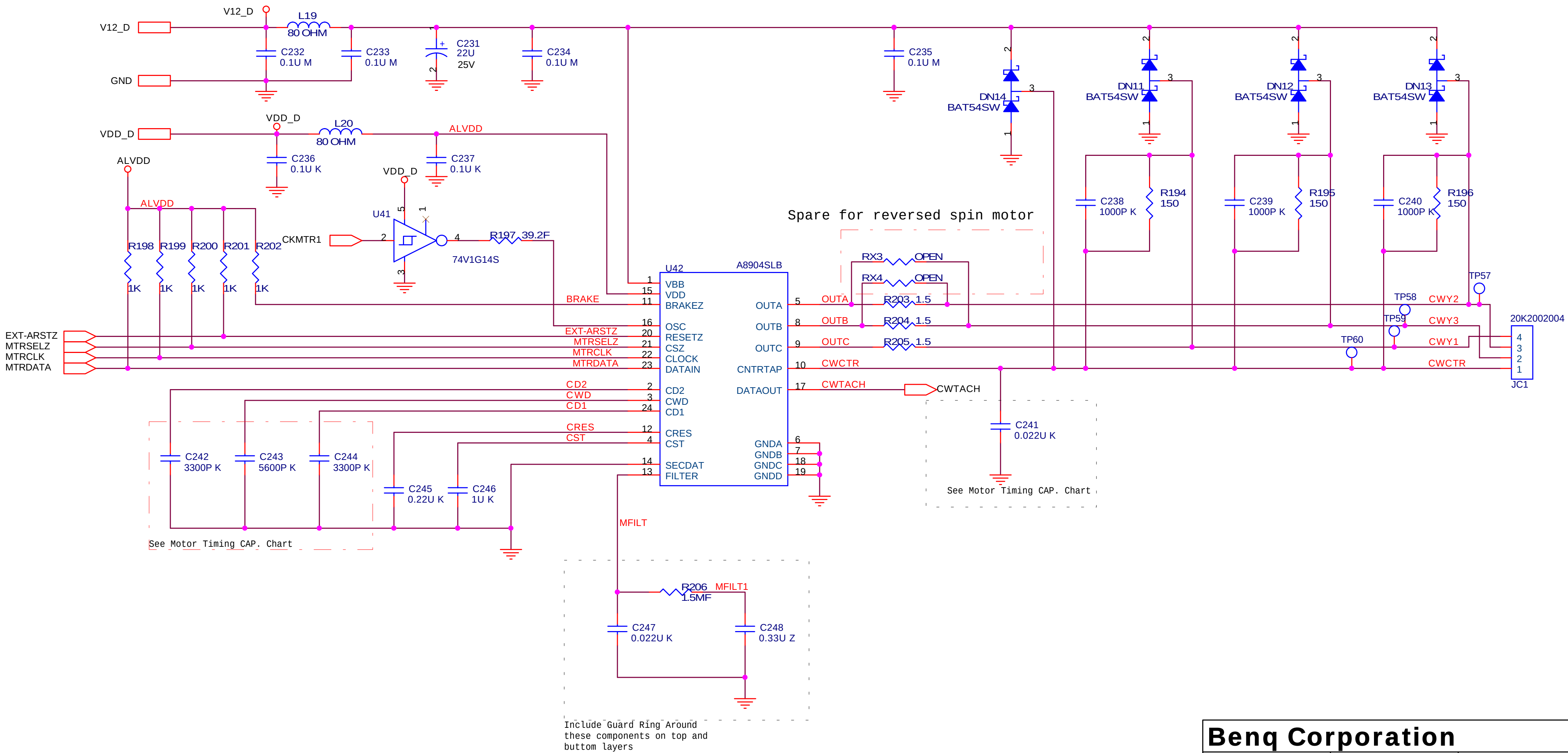


Benq Corporation		
Project Code 99.J8677.001	Model Name PB6100	OEM/ODM Model Name <OEM/ODM>
Title MAIN BOARD		
Size <Size> / PCB P/N 48.J8601.S04	PCB Rev. S04 / Document Number 99.J8677.B12-C3-304-004	Rev. 1
Date: Tuesday, October 07, 2003		Sheet 17 of 20
Prepared By ANGEL HU	Reviewed By DAVID HN LIN	Approved By KELVIN LIAO

The width of net MBRST[0:15] should be larger than 11mils and the distance between two net should be larger than 11 mils.



Benq Corporation				
Project Code 99.J8677.001	Model Name PB6100		OEM/ODM Model Name <OEM/ODM>	
Title MAIN BOARD				
Size <Size>	PCB P/N 48.J8601.S04	PCB Rev. S04	Document Number 99.J8677.B12-C3-304-004	Rev. 1
Date: Tuesday, October 07, 2003			Sheet 18 of 20	
Prepared By ANGEL HU	Reviewed By DAVID HN LIN		Approved By KELVIN LIAO	



Benq Corporation

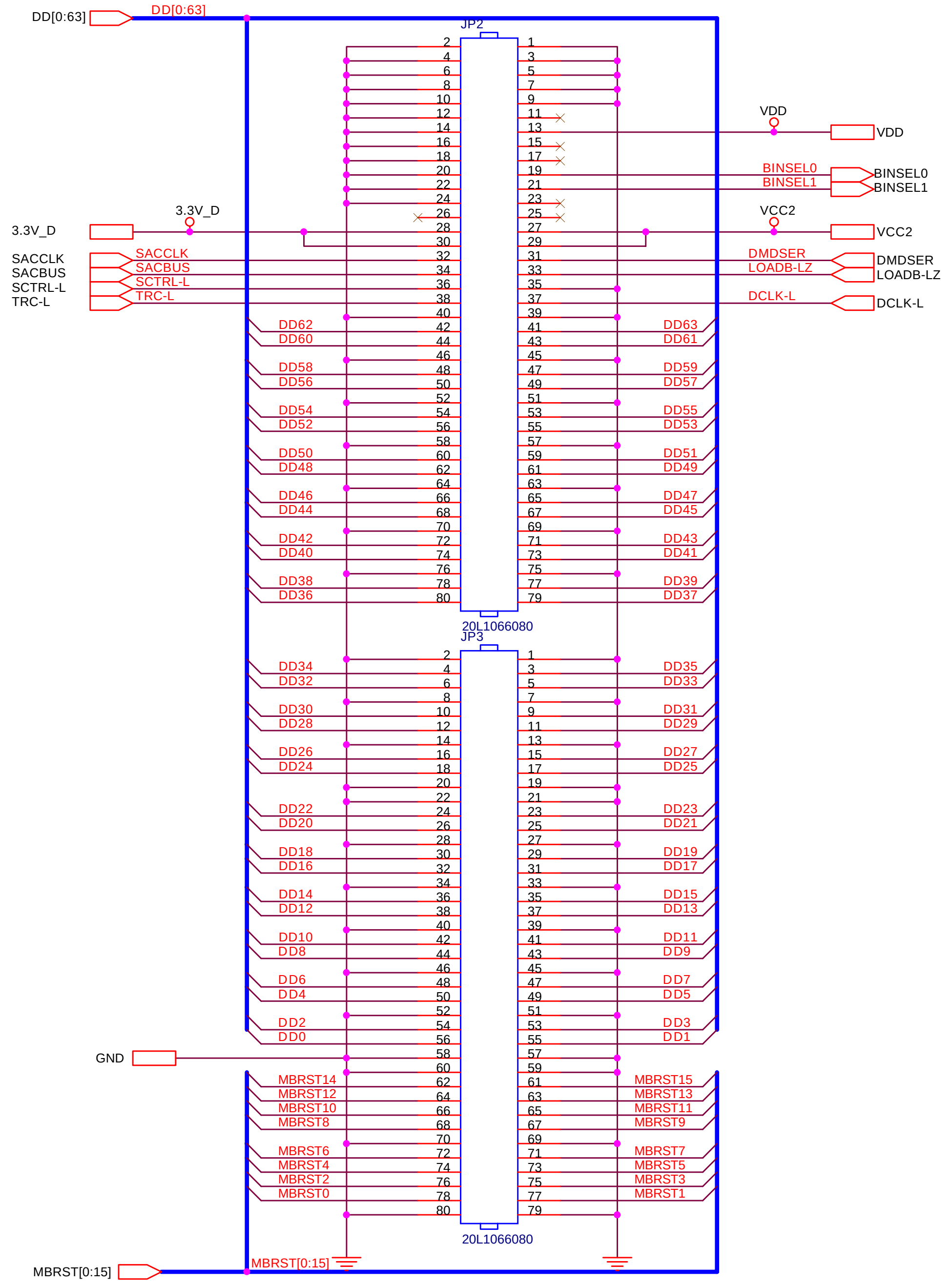
Project Code	Model Name	OEM/ODM Model Name
99.J8677.001	PB6100	<OEM/ODM>

Title: MAIN BOARD

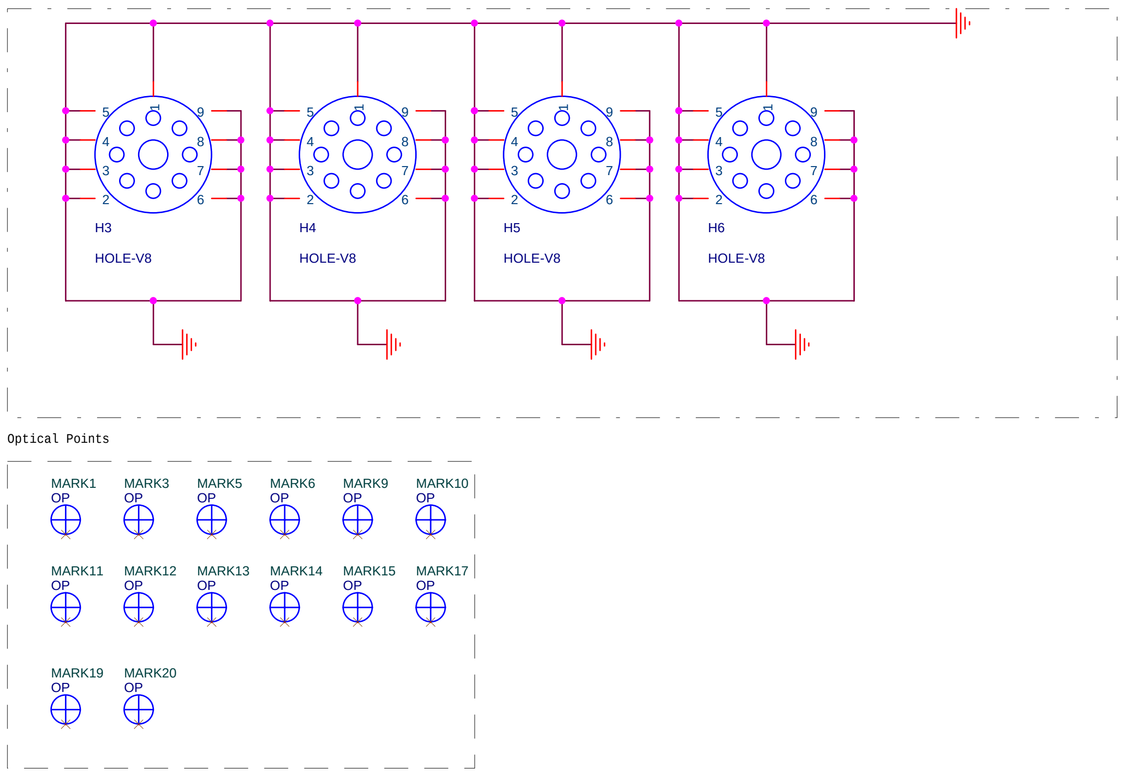
Size	PCB P/N	PCB Rev.	Document Number	Rev.
<Size>	48.J8601.S04	S04	99.J8677.B12-C3-304-004	1

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Prepared By	Reviewed By	Approved By
ANGEL HU	DAVID HN LIN	KELVIN LIAO



Screw Holes



Benq Corporation

Project Code	Model Name	OEM/ODM Model Name		
99.J8677.001	PB6100	<OEM/ODM>		
Title: MAIN BOARD				
Size <Size>	PCB P/N 48.J8601.S04	PCB Rev. S04	Document Number 99.J8677.B12-C3-304-004	Rev. 1
Date: Tuesday, October 07, 2003		Sheet 20 of 20		
Prepared By	Reviewed By	Approved By		
ANGEL HU	DAVID HN LIN	KELVIN LIAO		